



# Jackson County

## Clean Energy Plan



# Project Team



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# Acknowledgements



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*Mike Steines, Member*

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School of Planning  
and Public Affairs

# Presentation Outline

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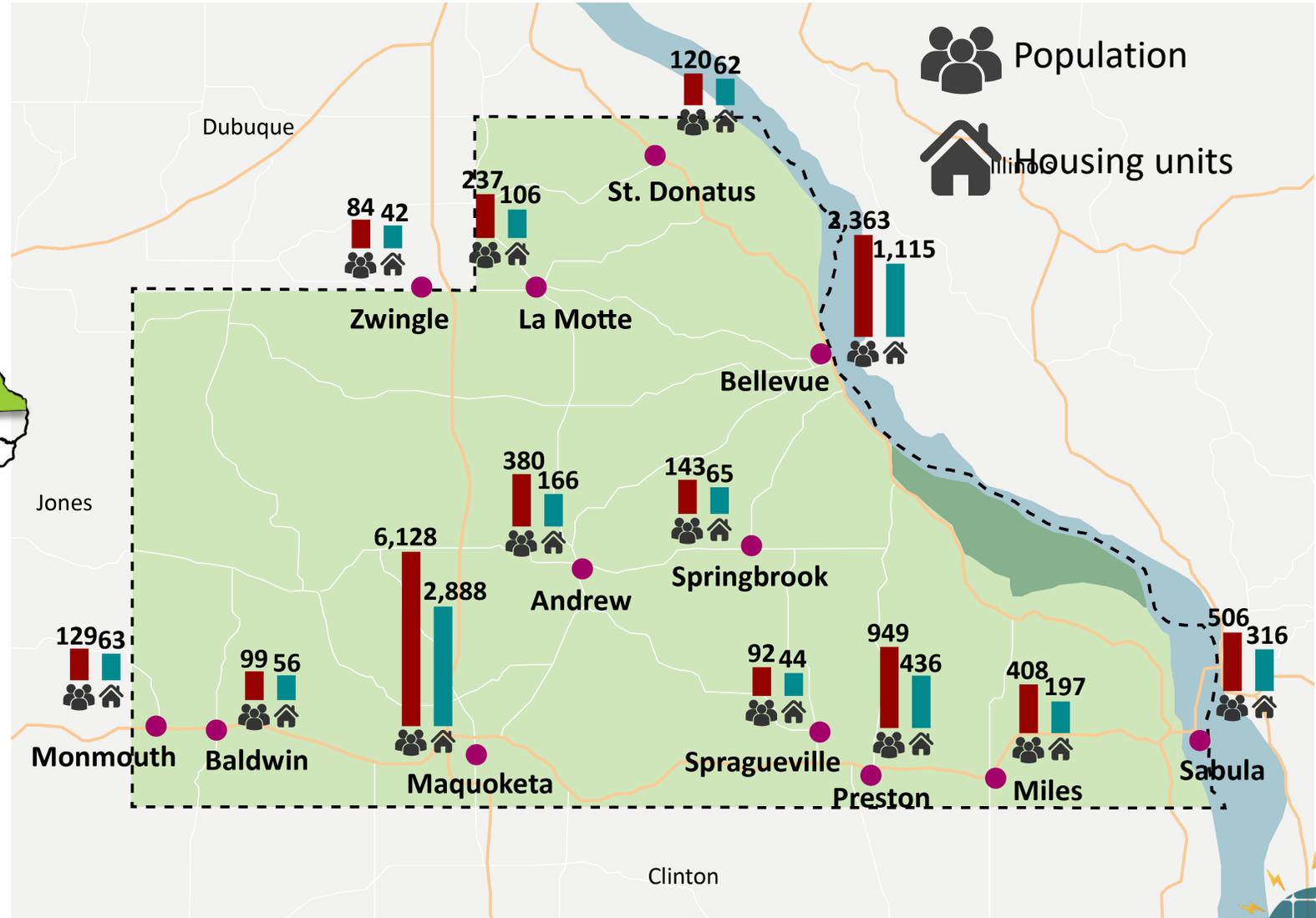
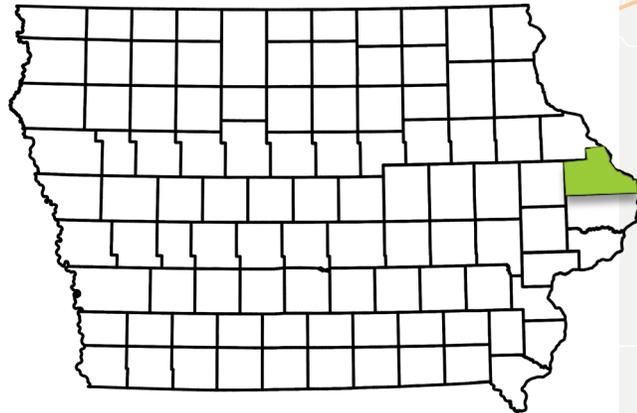
- 1 Plan Overview
- 2 Existing Solar Installations
- 3 Solar Feasibility Study
- 4 Springbrook Clean Energy Pilot Project
- 5 Recommendations
- 6 Questions



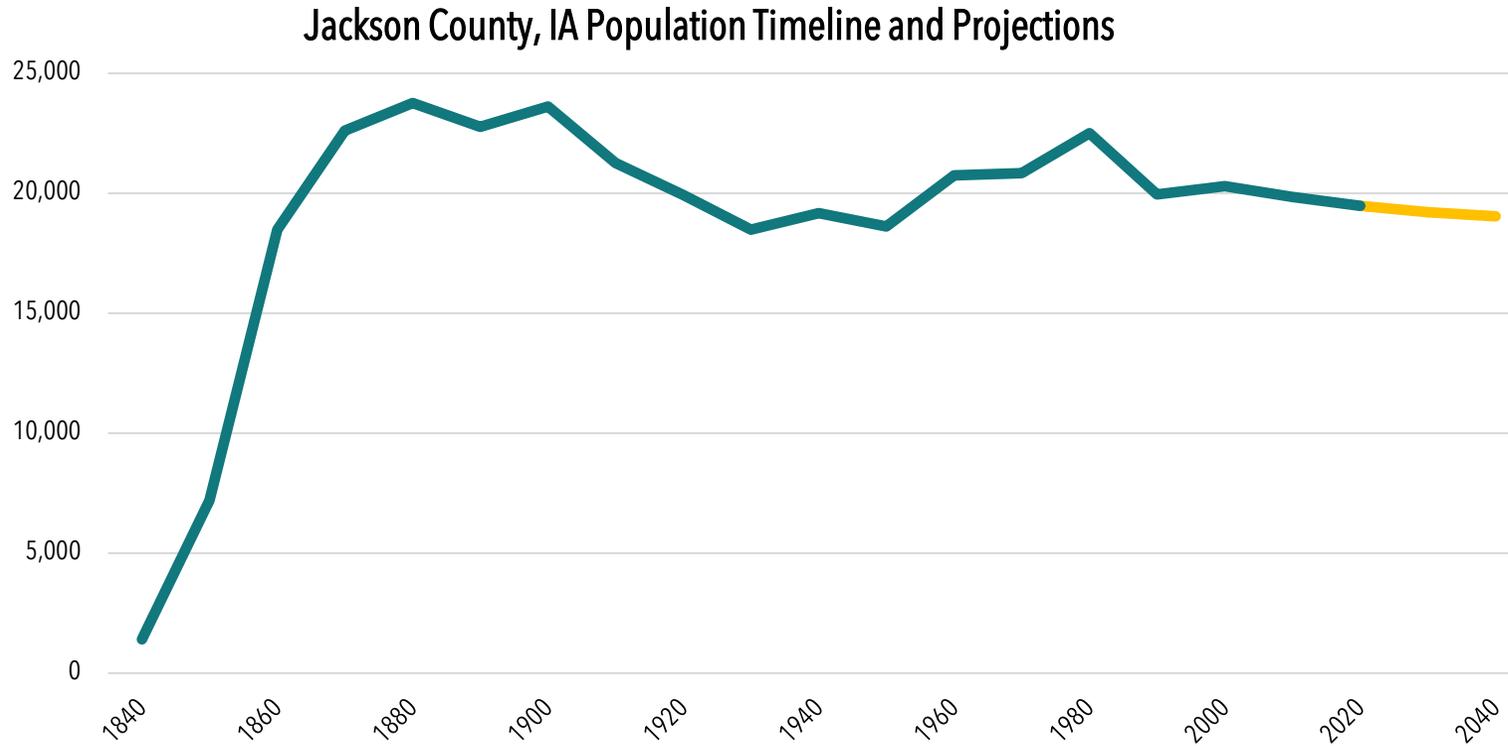
# Plan Overview



# Location



# Population



# Vision & Goals

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The long-term vision for Jackson County's energy is to be...



**Locally Owned**



**Diverse**



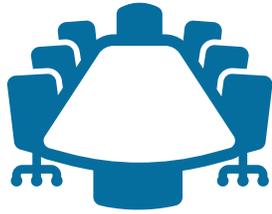
**Equitable**

- 
- Retain energy money in the county
  - Promote initiatives toward local energy production
  - Attract new residents and be an Iowa leader in clean energy production for rural counties.

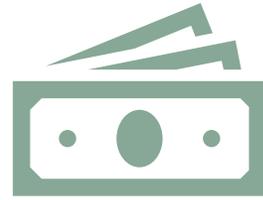


# Why Solar?

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**Project partner  
interest**



**Rising energy costs**



**Reduce reliance on  
fossil fuels**



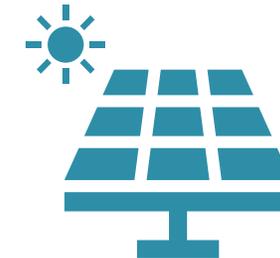
**Disaster resiliency**



**Reduce greenhouse  
gas emissions**



**Local economic growth**



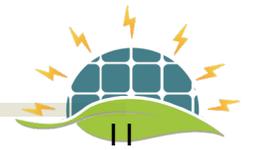
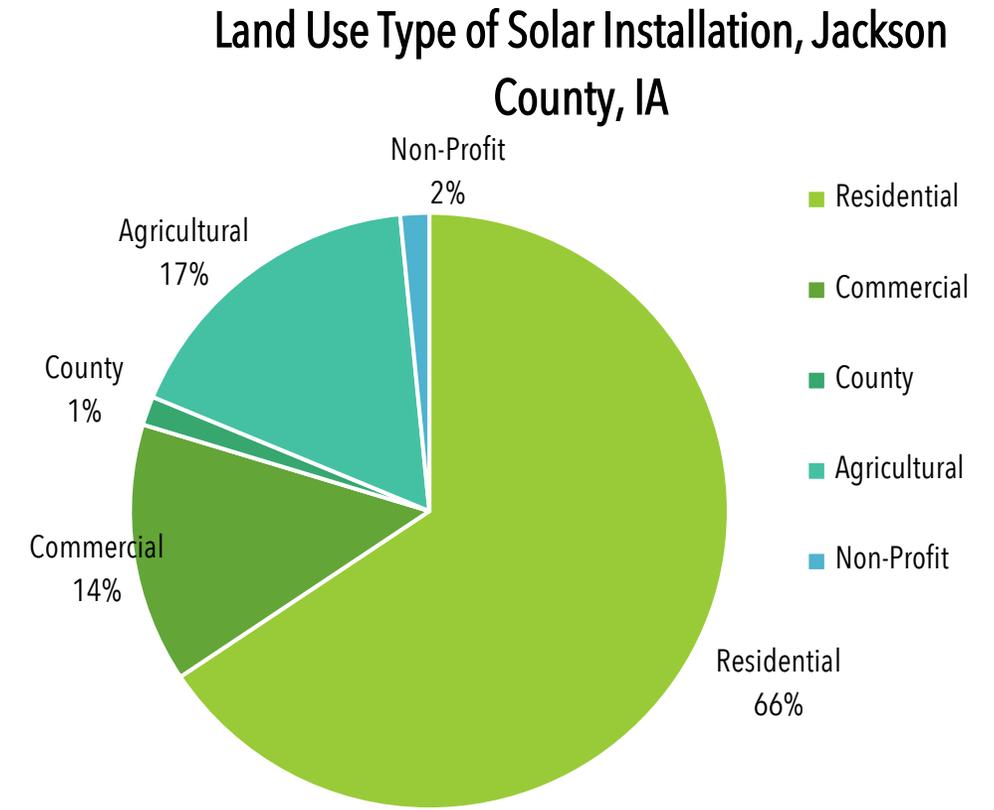
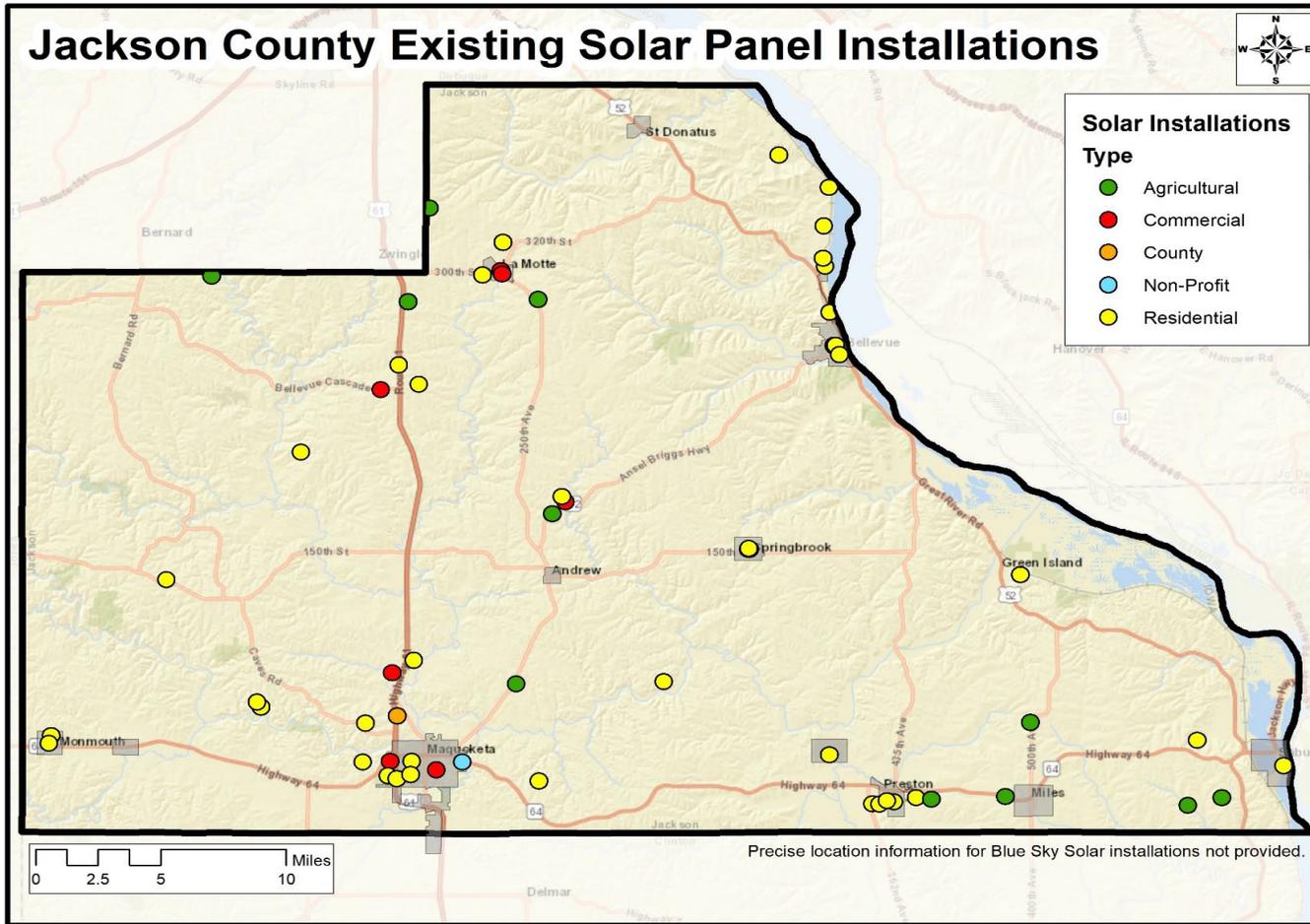
**Declining cost of solar  
panels**



# Existing Solar Panel Installations

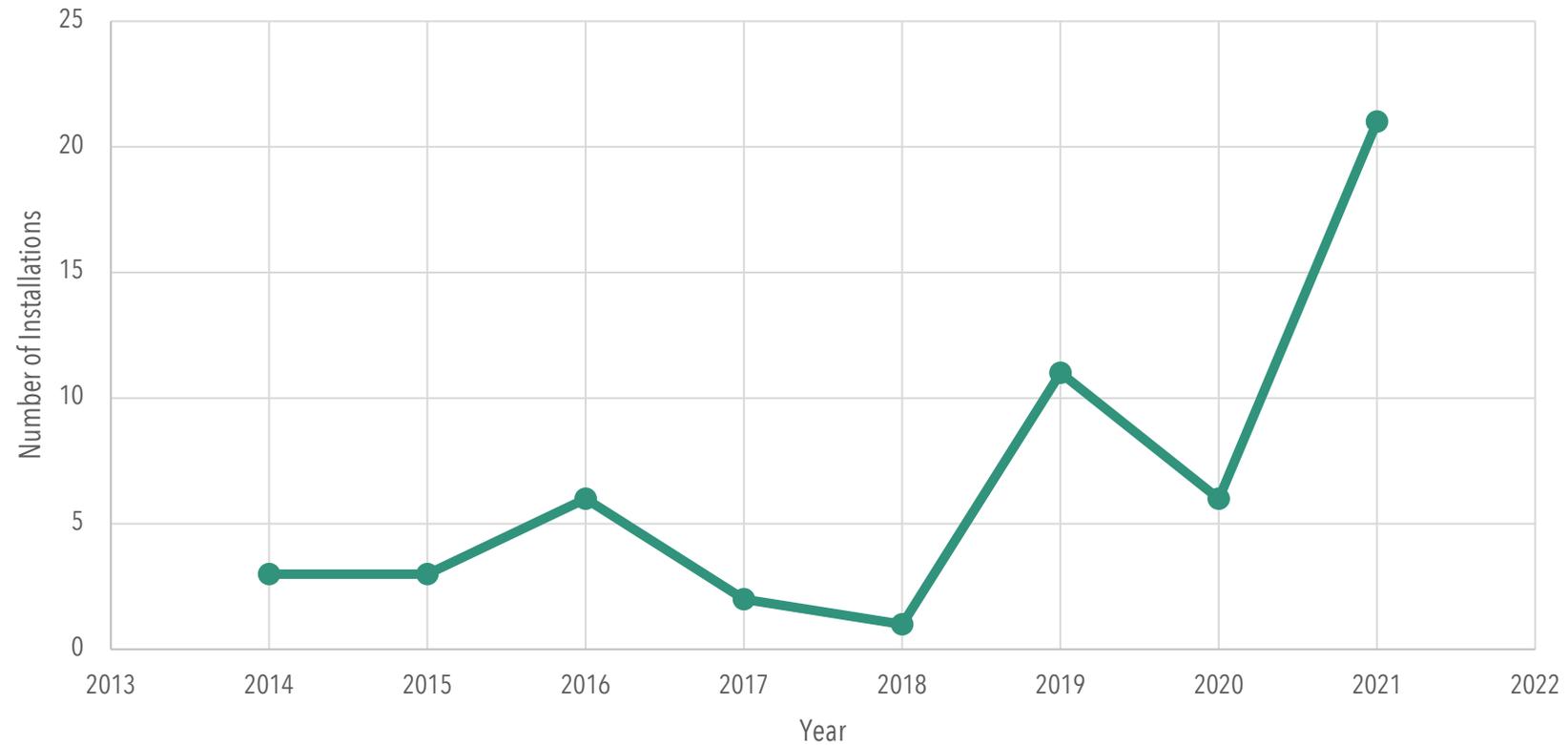


# Existing Solar Panel Installations



# Solar Panel Installation Trend

Solar Installations by Year



# Solar Installation Interactive Map

**Jackson County Solar...**  
Jackson County Clean Energy Team

49 views  
Published 3 hours ago

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**Pre 2022 Installations**

- Residential
- Agricultural
- Commercial
- Non-Profit
- Public

Map data ©2022 Imagery ©2022 TerraMetrics [Terms](#) 5 mi



# Solar Feasibility Study



# Overview

## Purpose

Examine 13 sites with Jackson County owned-buildings to identify the economic feasibility of installing PV solar systems.

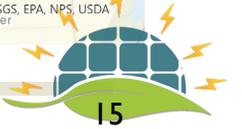
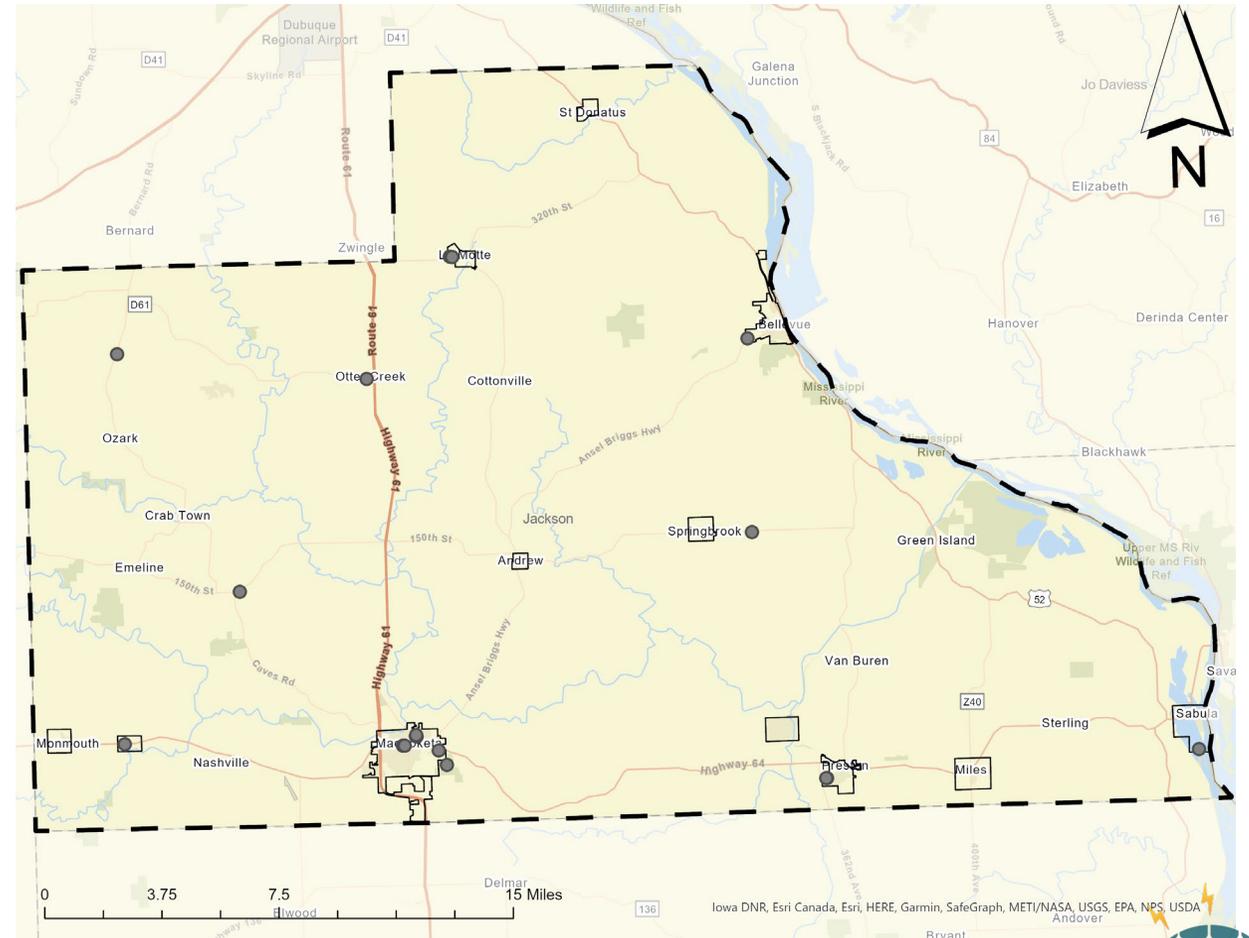
## Goals

To reduce county operational costs and invest in renewable energy

## Deliverables

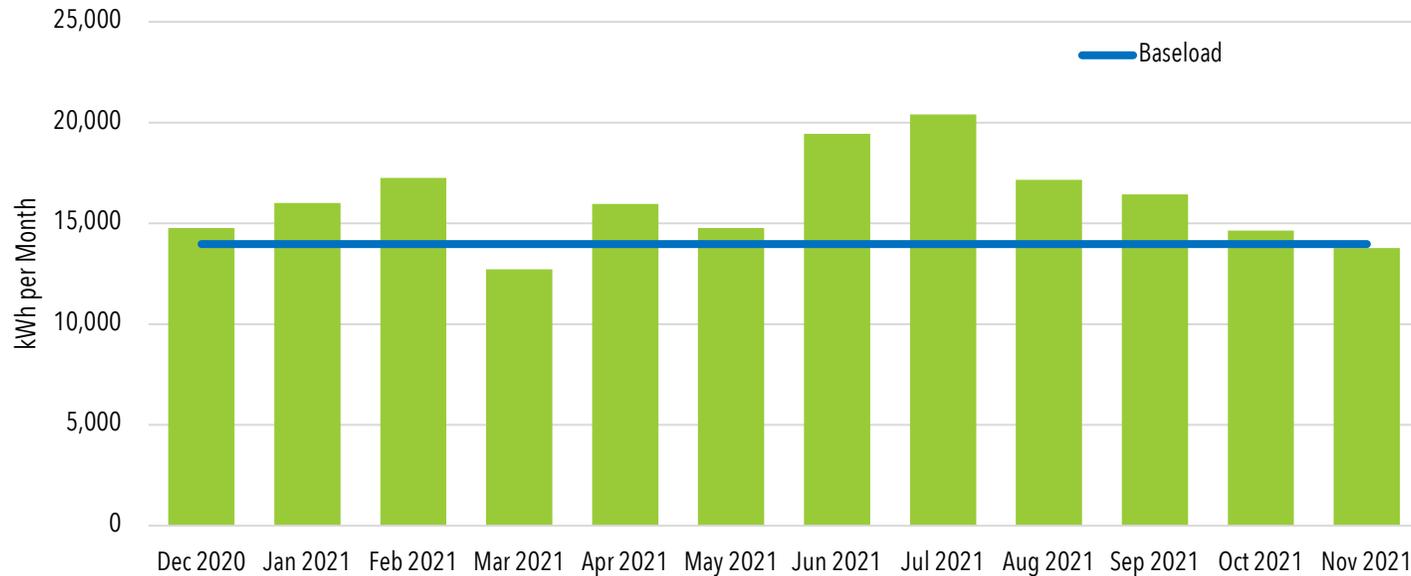
Estimated economic payback analysis for solar installations based on energy consumption and power generation.

## Jackson County Building Inventory



# Jackson County Jail

146 Jacobsen Dr Electricity Usage

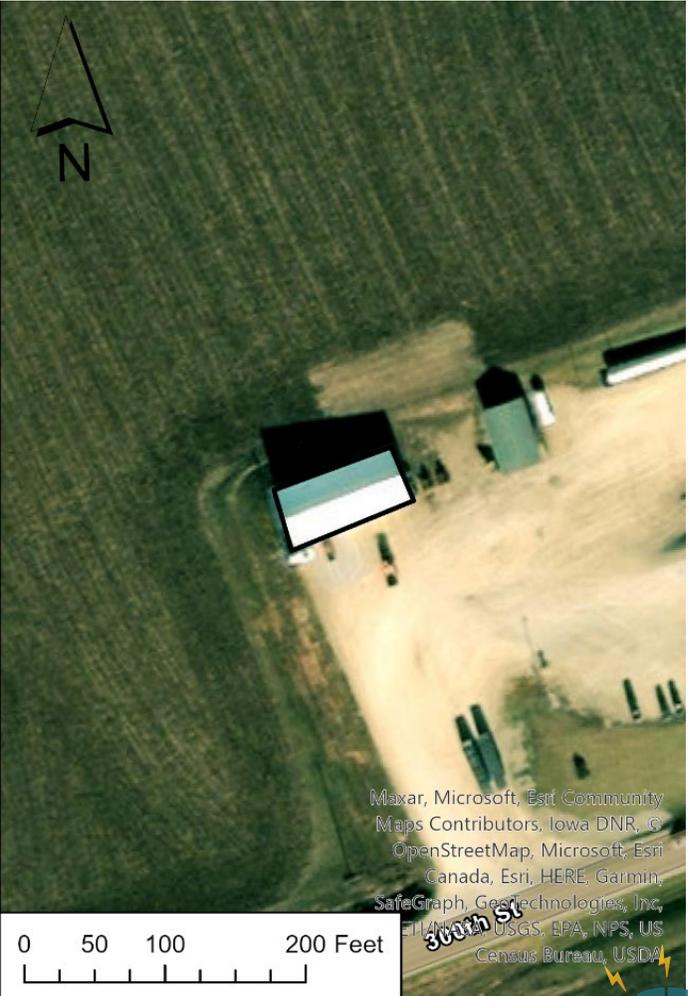
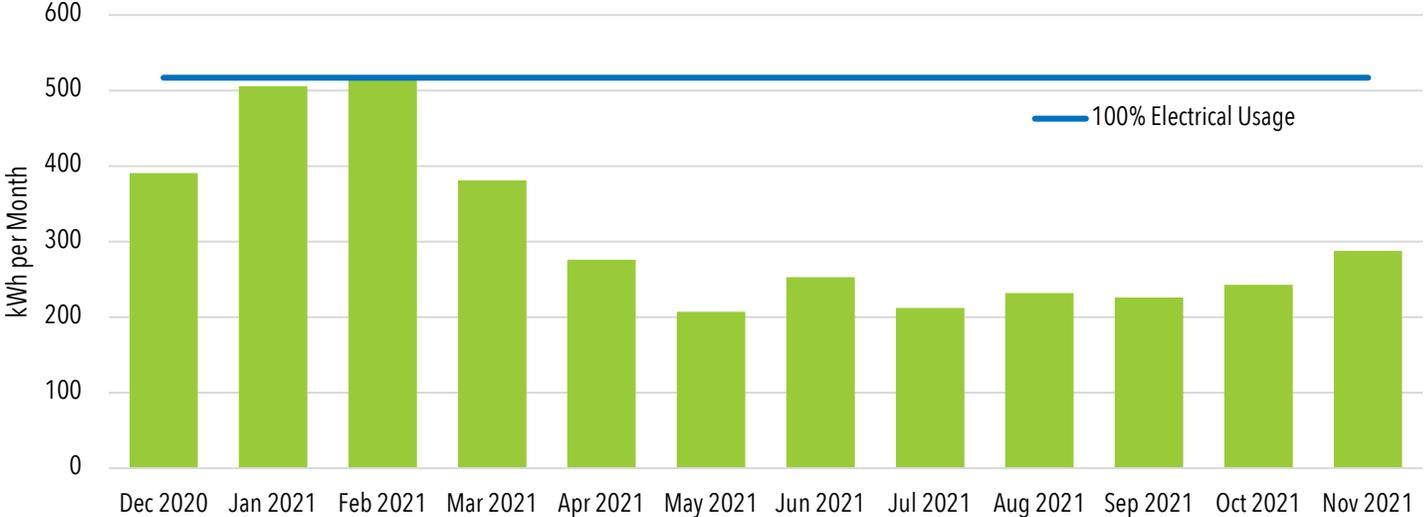


Delaware County Jail	
System costs	\$172,000 - \$277,000
Avoided costs	\$557,000
Total return	\$280,000 - \$385,000
Payback period	5.4 - 8.7 years



# La Motte Shop

524 Elm St. Electricity Usage



La Motte Shop	
System costs	\$7,300 - \$10,300
Avoided costs	\$20,400
Total return	\$10,000 - \$13,000
Payback period	6.3 - 8.8 years



# Methodology & Results

- The size of each PV solar system was calculated by using the **building utility data**
- The estimated electricity cost was calculated by using **current utility rates**.
- The **avoided electricity cost** is used to calculate the payback period on each system.

Analysis of 13 County Building Sites:	
System costs	\$670,000 - \$944,000
Avoided costs	\$1.7 Million
Return per year	\$30,500 - \$41,400
Payback period	6.9 - 9.6 years
System Size	373 kW DC

## Feasibility Study Assumptions

The analysis is based on the following assumptions about solar panels, environmental features, and energy costs:

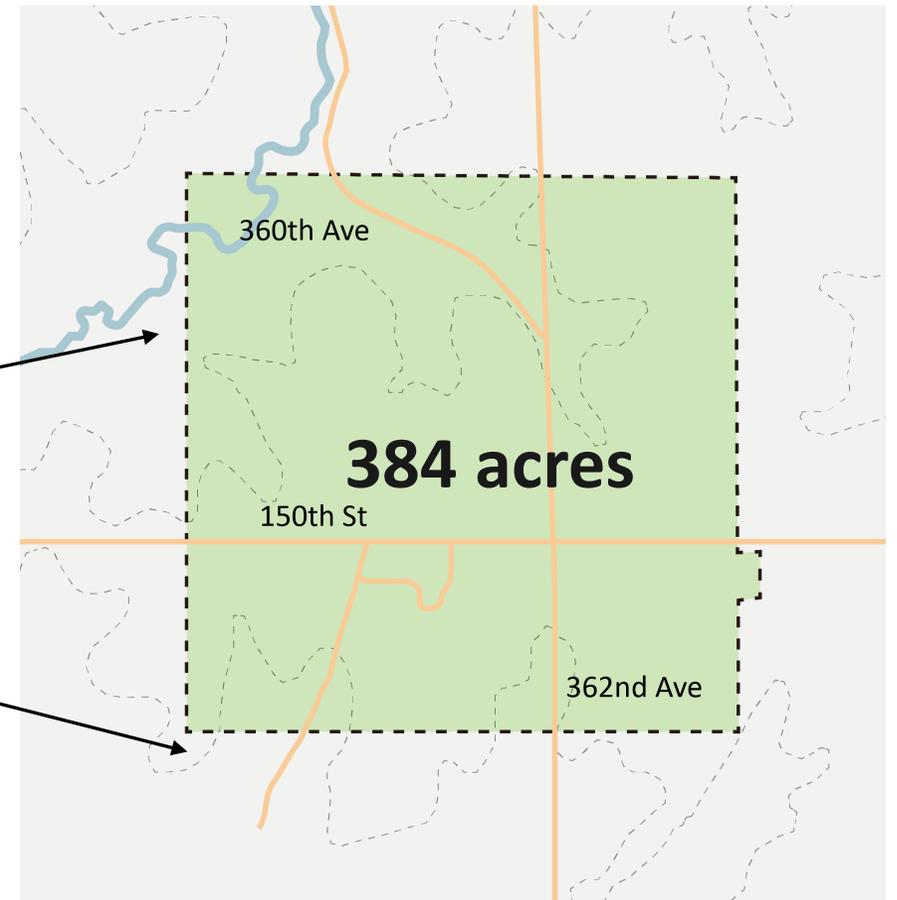
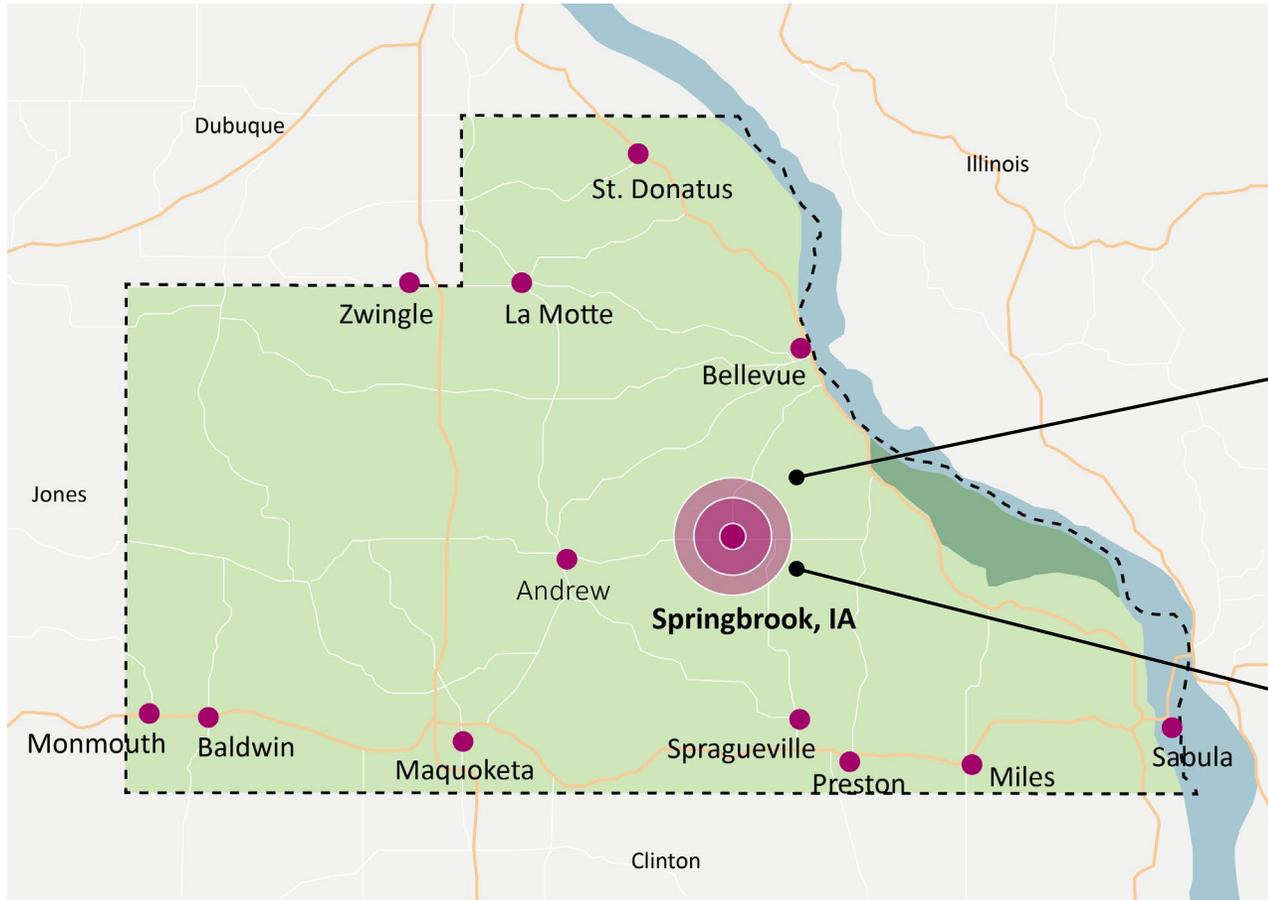
- 340-Watt Panel produce 43.5 kWh/month (Solar reviews, 2021)
- 4.5 hours of Peak Sunlight (Hyder, 2019)
- Price is between \$2.53 - \$1.80 per Watt
- Solar panel warranted lifetime is 25 years (NREL, 2018)
- 3% annual inflation in energy costs over the 25-year lifetime.
- Jackson County building rooftops are assumed to be structurally strong enough to support PV solar panels.



# Clean Energy Pilot Project: **Springbrook**

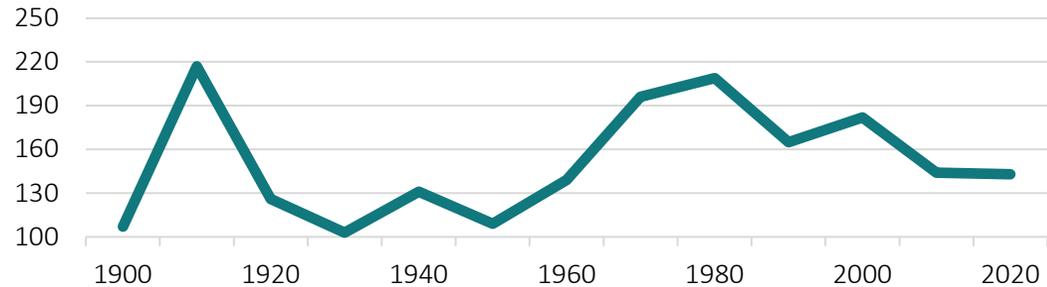


# Location



# Springbrook, IA: Profile

Population Trends, Springbrook, IA  
2010-2020



Individual solar panel in Springbrook

	Population	Num. of Households	Median Age	Median Income	Annual Energy Consumption
<b>Springbrook</b>	143	65	56	\$66,875	791 MWh
<b>Jackson County</b>	19,348	8,183	44	\$59,042	325,979 MWh
<b>State of Iowa</b>	3.2 million	1.3 million	38	\$61,836	52,908,449 MWh

Source: American Community Survey 5-Year Estimates (2016-2020); U.S. Census Bureau (2020); Alliant Energy; FindEnergy Electric Profiles



# Engaging the community

**Goal:** Collecting Springbrook resident input on energy priorities, concerns, and experiences

- **Door-to-door campaign** (November 6, 2021)
- **Community survey** (November 2021)
- **Project website**



# Energy Priorities

❖ Lower energy bills 

❖ Continue service with Alliant Energy 

❖ Diversify energy sources towards renewables 

\*Did not cite climate change or resiliency as a motivator

# Opportunities

- Strong city leadership + resident support for a solar project
- Available land for ground-mounted PV solar
- Higher median household income
- No need to update grid infrastructure with fiber optics (less than 1 MW consumption demand)



# Challenges & Limitations

- **Facility maintenance** and operation capability
- **Financing** solar facility
- Franchise agreement limitations
- **Dependency** on Alliant Energy
- Less financial return on solar investment due to **economies of scale of smaller centralized solar** production projects
- **Virtual net metering** not available
- Relative **profitability** of Third-Party Power Purchase Agreements (PPA) vs. direct purchase
- Limited **equity** opportunities



# Alliant Energy Meeting

- Presented case for potential partnership with Alliant in February 2022
- Passed application to company's engineers to assess infrastructure
- Received application denial in April 2022

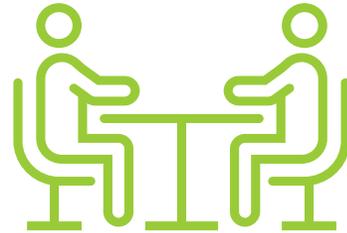


# Ownership Models:



## City of Springbrook

Municipal Utility

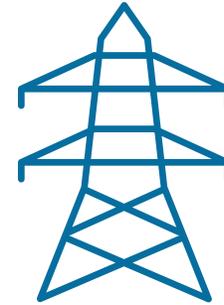


## Third Party (PPA)

Municipal Utility

Ground: 250 kW >

Roof: 500 kW >



## Alliant Energy

Min: 200 kW – 1 MW



# Recommendations



# Springbrook Recommendations

## Short-term

- Encourage and educate community of household solar installation
- Create incentives to assist upfront cost
- Install solar facility for city services (w/ cost comparison for PPA and grants)

## Long-term

- Continue to pursue partnership for centralized solar facility with Alliant Energy
- Pursue potential battery system project if the grid demand from solar installation increases
- Incorporate clean energy objectives in franchise agreement



# Feasibility Study Recommendations

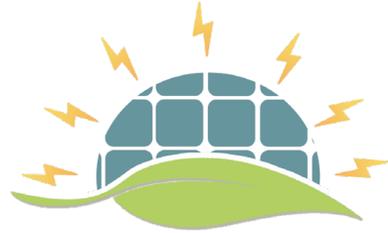
## Short-term

- Continue to explore PV solar systems on county facilities
  - Solicit estimates from local solar installers

## Long-term

- Invest in Jackson County facilities outlined in the feasibility study





# Questions?

# Appendix





## Delaware County Jail

Bill Date	Electricity Cost	Energy Usage (kwh)
24-Mar-21	\$2,527.21	18,400
26-Apr-21	\$2,078.05	15,960
24-May-21	\$2,087.00	14,760
24-Jun-21	\$3,127.44	19,440
26-Jul-21	\$3,453.10	20,400
25-Aug-21	\$3,004.06	17,160
27-Sep-21	\$2,757.25	16,440
26-Oct-21	\$2,166.18	14,640
23-Nov-21	\$1,970.94	13,680
22-Dec-21	\$2,067.34	14,760
<b>Totals</b>	<b>\$25,238.57</b>	<b>165,640</b>

**Source:** Alliant Energy

# Electric Vehicles

## Types:

Plug-In Hybrid Electric Vehicle (PHEV)

Battery Electric Vehicle (BEV)

Hybrid Electric Vehicle (HEV)

## Cost Per Gallon (In Iowa):

Electric Vehicle (eGallon): \$1.03

Gas-Powered Vehicle: \$2.76

## Range on One Charge:

*PHEV*: 50 miles in all-electric mode,

500 miles before recharging

*BEV*: More than 300 miles

## Average Costs:

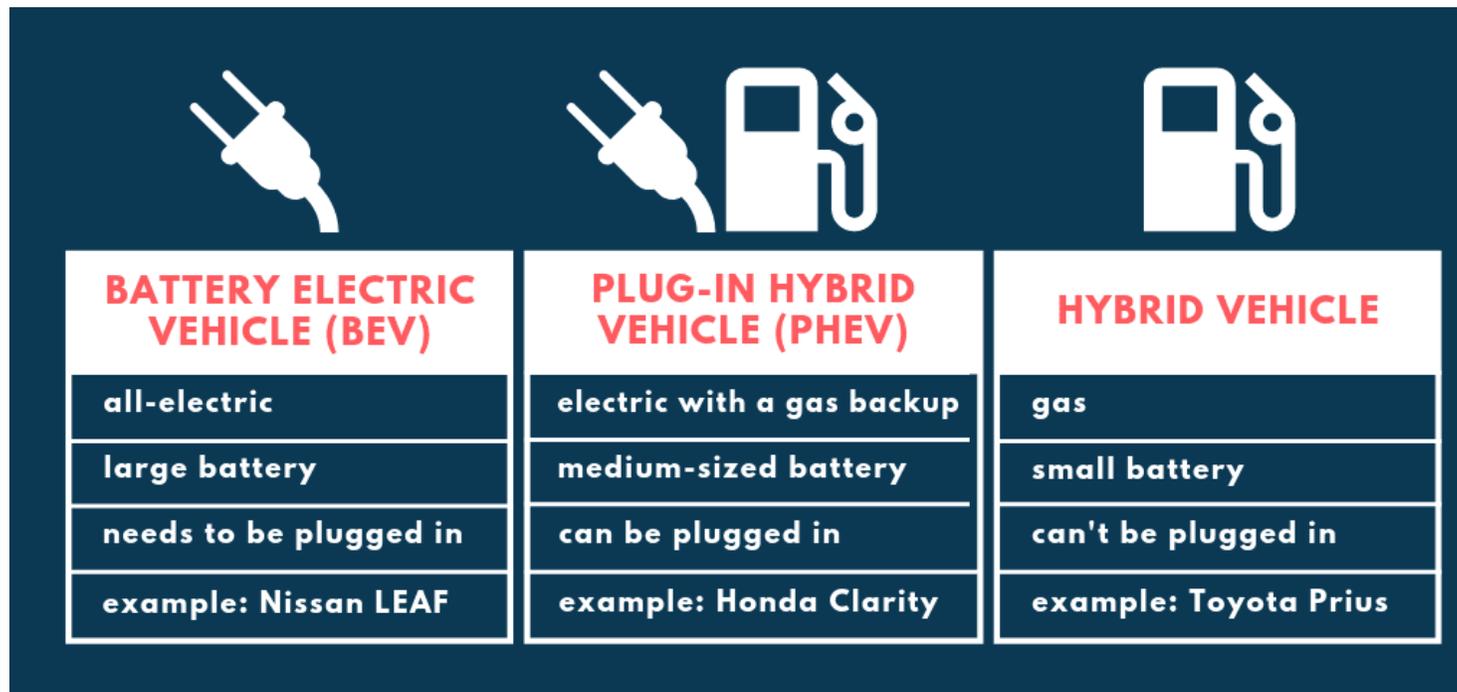
Electric Vehicle: \$56,327

Gas-Powered Vehicle: \$46,329

## Operation Costs Per Year (2018):

Electric Vehicle: \$485

Gas-Powered Vehicle: \$1,117



 <b>BATTERY ELECTRIC VEHICLE (BEV)</b>	 <b>PLUG-IN HYBRID VEHICLE (PHEV)</b>	 <b>HYBRID VEHICLE</b>
<b>all-electric</b>	<b>electric with a gas backup</b>	<b>gas</b>
<b>large battery</b>	<b>medium-sized battery</b>	<b>small battery</b>
<b>needs to be plugged in</b>	<b>can be plugged in</b>	<b>can't be plugged in</b>
<b>example: Nissan LEAF</b>	<b>example: Honda Clarity</b>	<b>example: Toyota Prius</b>

**Source:** <https://pscleanair.gov/564/Electric-Vehicles>

# Electric Vehicles Continued...

Services costs are **31%** lower than gas-powered vehicles after **36** months on the road.

Can qualify for a **\$2,500** to **\$7,500** non-refundable tax credit from the Federal Government for purchasing an electric vehicle built after **2010**\*\*

Electric Vehicles produce **54%** less carbon pollution than gas-powered vehicles

Every **500** miles driven gas-free is equivalent to planting **119** trees

Alliant Energy offers a **\$750** rebate for those that purchase a **Level 2** charging station

In Iowa, the direct sale of electric motor vehicles is **prohibited**

Iowa charged a **\$97.50** electric vehicle fee in 2021 and that fee increased to **\$130** in 2022

Iowa is ranked as the **worst** state in the US for electric vehicle access

*\*\*Only if it is one of the first 200,000 built by the manufacturer*

# Electric Vehicle Chargers

## Charging Level Summary

### Charger Costs:

*Level 1:* Comes with most electric vehicles and can plug into a 120-volt household outlet

*Level 2:* Around \$2,000

*Level 3:* Between \$12,000 and \$35,000

Level	ChargeHub Markers	Power (kW)	Approximate Charging Time (Empty Battery)
1		1	200 km (124 miles): +/- <b>20 hours</b> 400 km (249 miles): +/- <b>43 hours</b>
2		3 to 20, typically 6	200 km (124 miles): +/- <b>5 hours</b> 400 km (249 miles): +/- <b>11 hours</b>
3 (DCFC)		Typically 50, occasionally 20	80% of 200 km (124 miles): +/- <b>30 min</b> 80% of 400 km (249 miles): +/- <b>1 hour</b>

**Source:** <https://chargehub.com/en/electric-car-charging-guide.html>

# Public Engagement

## Respondent Profile

- About **91%** of the respondents were above the age of **50**.
- **44%** of the Respondents had an annual household income **between \$30,000 and \$74,999**.
- About **21%** work in farming or agriculture and **24%** are self-employed.

## Community Growth

- What the reasons are for living in Springbrook? Affordable housing (18%); Family (16%); Size of the community (15%)
- **57%** hope to see moderate population growth (**<10%**) in Springbrook.

## Energy Priorities

- The most important factors to Springbrook's energy future: **Lower energy bills (44%)**
- **45%** of the respondents' monthly utility bill is between **\$150-200**.
- The longest power outage is between **1-5 hours**.

## Energy Use

- **50%** do NOT want any increase to their energy bill if it meant purchasing renewable energy, while **30%** were willing to see a slight increase (**<10%**)
- **62%** are interested in Springbrook being an energy pilot community.
- **55%** are NOT interested in Springbrook establishing a municipal owned utility.

# Survey

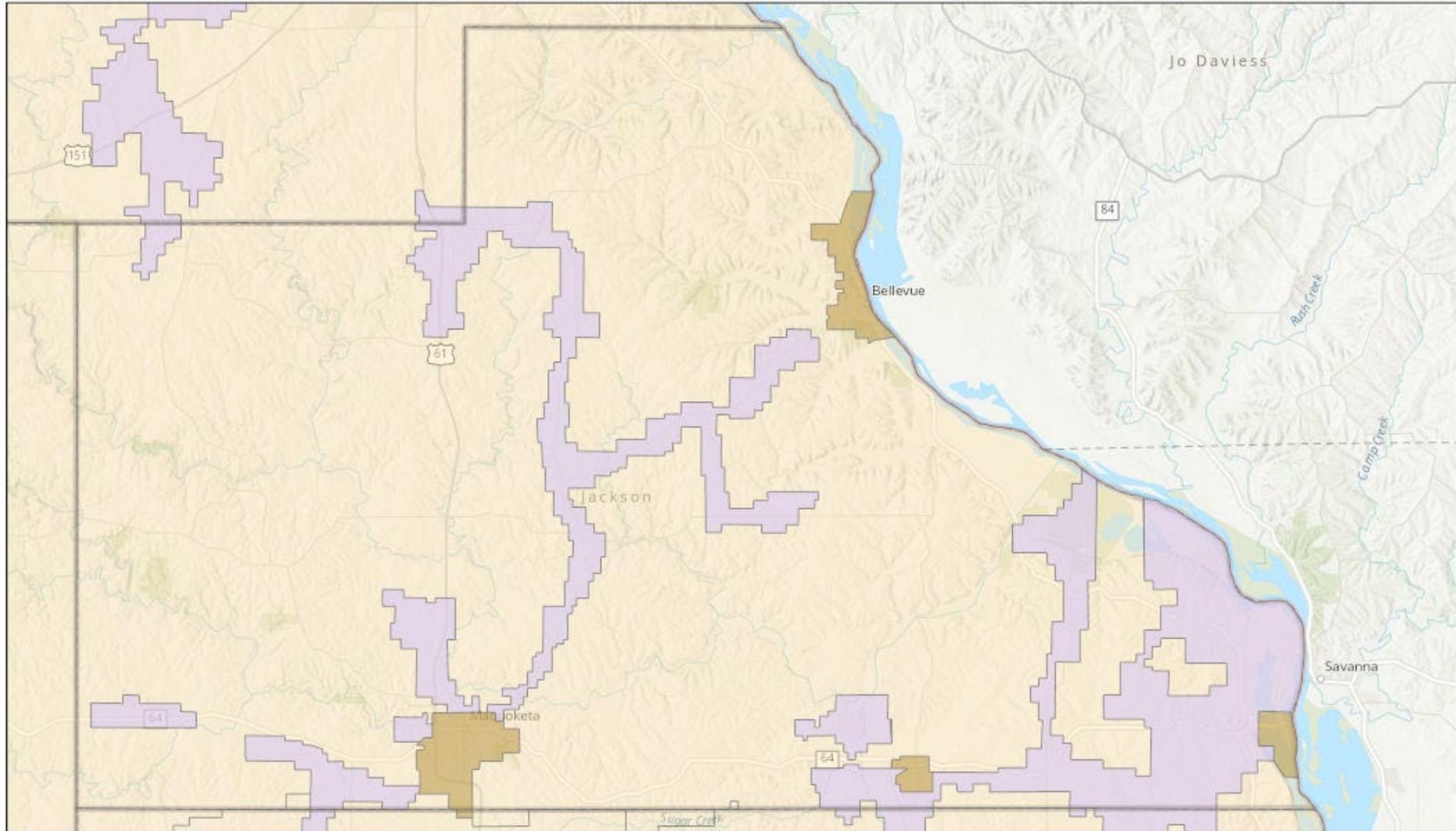
# Case Studies

Alliant Energy announced in October 2021 that their first community microgrid system will be built in the Village of Boaz in Richland County, Wisconsin to enhance the community's energy reliability.

This is a small village of 156 people that experienced ten power outages between 2017-2019. This project will create a small-scale, independent utility grid with a dedicated power source that will allow it to provide energy to its customers when the central grid is down, or service is interrupted. As the microgrid disconnects from the central grid, it can still provide power to around 120 customers through one or more distributed generation sources such as batteries, wind, solar, or combinations thereof (Church, 2021).

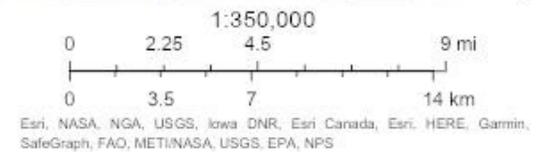
## Community-Microgrid in Boaz, Wisconsin

# Electrical Service Area Boundary



9/16/2021, 4:37:04 PM

Electrical Service Boundaries



	ArcGIS (ESRI)/ArcGIS Pro (ESRI)	ArcGIS Story Maps	QGIS	OpenStreetMap	Google My Maps
Free use	No	Yes (Subscription unlocks more features)	Yes	Yes	Yes (not entirely)
Easy operation	No	Yes	No	Somewhat	Yes
Interactive Map	Yes	Yes	Yes	Yes	Yes
Data export	Yes	Need Subscription	Yes	Yes	Yes
Display information (pictures, data, location descriptions)	Yes	Yes	Yes	Yes	Yes
Multi-users not simultaneously	Yes	One account or Subscribe	Yes	One account	One account
Data Calculation	Yes	No	Yes	No	Via data table
Color difference by uses	Yes	No	Yes	Yes	Yes
Live data	Yes	Via website link	Yes	Via website link	Via website link
List on the side (navigation)	No	Yes	No	Yes	Yes
Further updates	Yes	Yes	Yes	Yes	Yes
Features other than maps	More technology-related features	Used for storytelling	More technology-related features	Yes	Yes, but may include additional costs

# Distributed Solar Generation

Description	Tax Benefits	Opportunities for Springbrook	Negatives	Funding Sources	Equity
<p>Distributed energy produced from a variety of small, grid-connected solar sources.</p>	<p>Private entities eligible for federal tax incentives.</p> <p><i>Iowa tax incentives expired in 2021.</i></p>	<p>Higher cost savings</p> <p>Cost of solar technology is declining</p> <p>Could lead to demand for microgrid or battery system facility for Springbrook.</p>	<p>Not accessible to all households due to high upfront cost, renters, rooftop design, etc.</p>	<ul style="list-style-type: none"> <li>• Alternative Energy Revolving Loan Program</li> <li>• Solar Loans</li> <li>• HomeStyle Energy Program</li> <li>• PPAs</li> <li>• Property Assessed Clean Energy Financing (PACE)</li> </ul>	<p>Equitable when all residents have an equal opportunity to reap the economic and environmental benefits of solar panel installation.</p>

# Alliant Energy Customer Hosted Renewables



1 Lease land or roof to Alliant Energy

2 Solar garden will be built and maintained by Alliant Energy

3 Clean energy powers home and businesses

Source: Alliant Energy

## Case Study: Alliant Energy Customer Hosted Solar Project with City of Perry, Iowa (Summer 2022)

- First Customer Hosted Solar Project in Iowa
- 1-megawatt solar facility (about 260 homes)
- 7-acre brownfield
- City will receive \$45,470 annually with a 25-year lease contract
- Residents do not get discounts on electricity bills
- City will obtain renewable energy credits to offset its greenhouse gas and carbon dioxide emissions



Source: Radio Iowa 42

# References

<https://www.saurenergy.com/solar-energy-news/total-adds-6-new-projects-to-its-distributed-solar-portfolio-in-se-asia>

<https://www.alliantenergy.com/cleanenergy/whatyoucando/customerhostedrenewables>

<https://theperrynews.com/perry-joins-alliant-energy-in-brownfield-solar-power-project/>

<https://www.desmoinesregister.com/story/tech/science/environment/2021/06/24/electric-vehicle-accessibility-index-evs-arent-easy-buy-own-iowa-tesla-consumer-choice-center/5320251001/>

<https://chargehub.com/en/electric-car-charging-guide.html>

<https://www.alliantenergy.com/cleanenergy/whatyoucando/electricvehicles>

<https://www.energy.gov/maps/egallon>

<https://www.cnbc.com/2021/12/29/electric-vehicles-are-becoming-more-affordable-amid-spiking-gas-prices.html>

Energy Sage “Solar Panel Size and Weight: How Big Are Solar Panels?” Solar News February 1, 2021, Accessed December 14, 2021. <https://news.energysage.com/average-solar-panel-size-weight/>.

Lane, Catherine. “Calculate How Many Solar Panels You Need for Your Home.” Solar Reviews. Solar Reviews, May 21, 2018. <https://www.solarreviews.com/blog/how-many-solar-panels-do-i-need-to-run-my-house>

# References

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“Portfolio Manager Technical Reference: U.S. National Energy Use Intensity.” Portfolio Manager Technical Reference: U.S. National Energy Use Intensity | ENERGY STAR, October 28, 2018. <https://www.energystar.gov/buildings/tools-and-resources/portfoliomanager-technical-reference-us-national-energy-use-intensity>.

“Project Locations.” Eagle Point Solar. Accessed November 20, 2021. <https://eaglepointsolar.com/project-locations/>

“Solar Energy Basics.” NREL.gov. Accessed November 20, 2021. <https://www.nrel.gov/research/re-solar.html>.