



**2021 Annual  
Conference & Exhibit**

*Iowa League of Cities*

## **SOLAR ENERGY: Why it is Worth Evaluating for Your Treatment Facility**

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Eagle Point Solar



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City of Centerville, Iowa



## Audience Poll

Who has undertaken major wastewater upgrades due to a new IDNR permit in the last 5 years?

Who has reduced their wastewater operating costs in the last few years?

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# Outline

1. Background on Wastewater Facilities & Energy Demands
2. Technical and Economic Feasibility of Solar
  - a. Site Conditions
  - b. Utility Policies
  - c. Funding Options
3. Case Study: Centerville, IA

# Background on Wastewater Facilities & Energy Demands



# Wastewater Treatment Facilities

- Facility Ownership
- Purpose



# Typical Energy Demands

- Pumping
- Aeration
- Mixing
- Heating/Cooling
- Disinfection



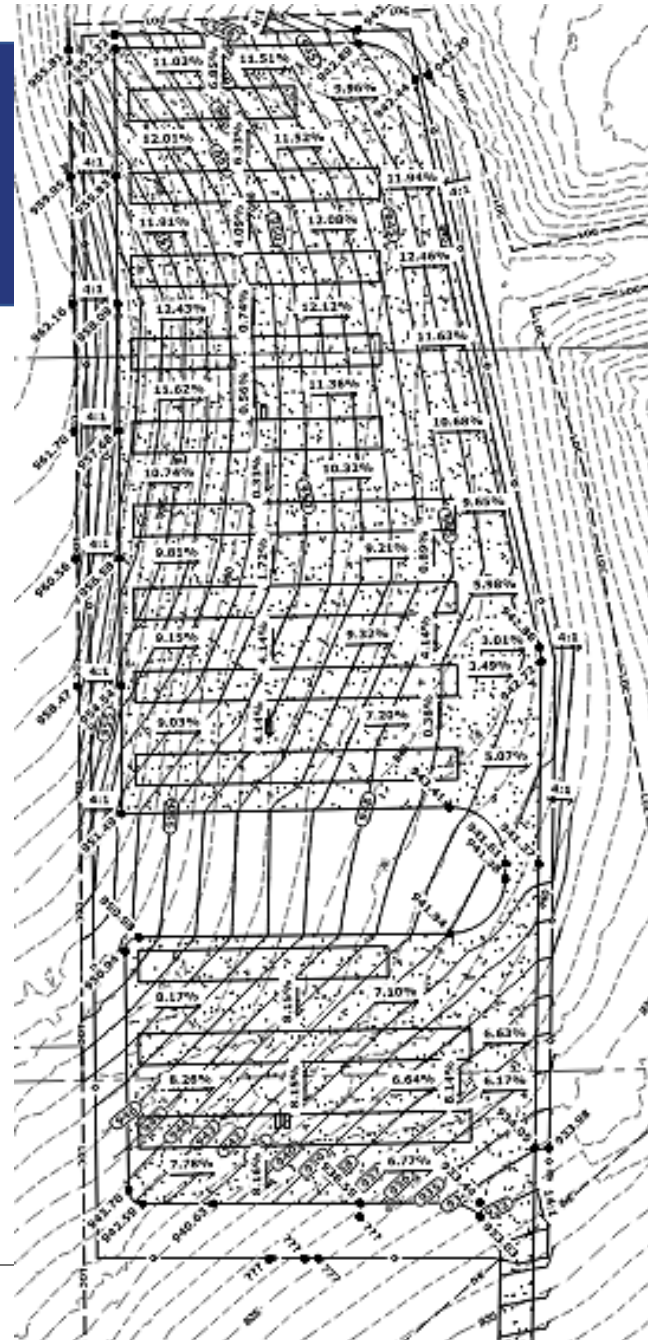
# Technical and Economic Feasibility of Solar

## Site Conditions



# Site Conditions

1. Land Availability
2. Facility Planning
3. Mounting Style
4. Setbacks
5. Grading
6. Soil Conditions
7. Distances
8. Trees/Obstructions



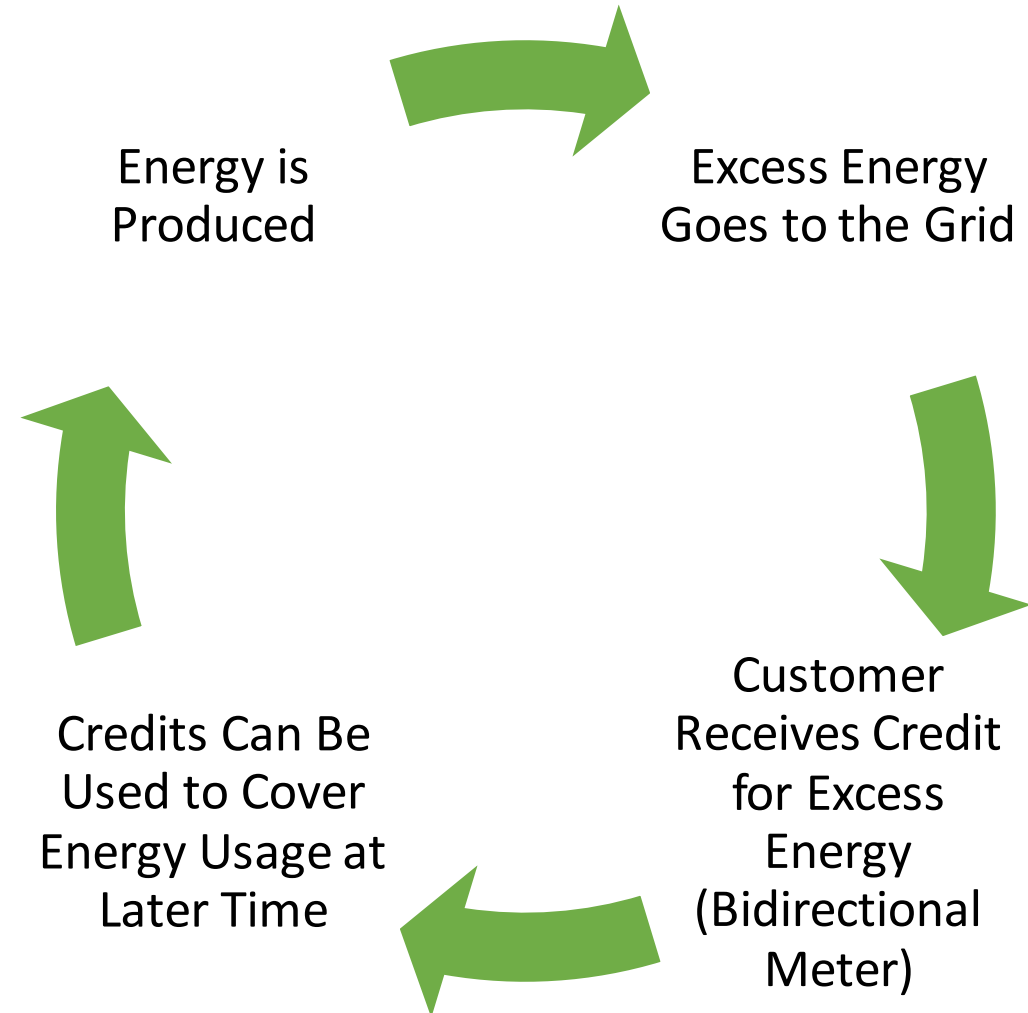
# Technical and Economic Feasibility of Solar

## Utility Policies

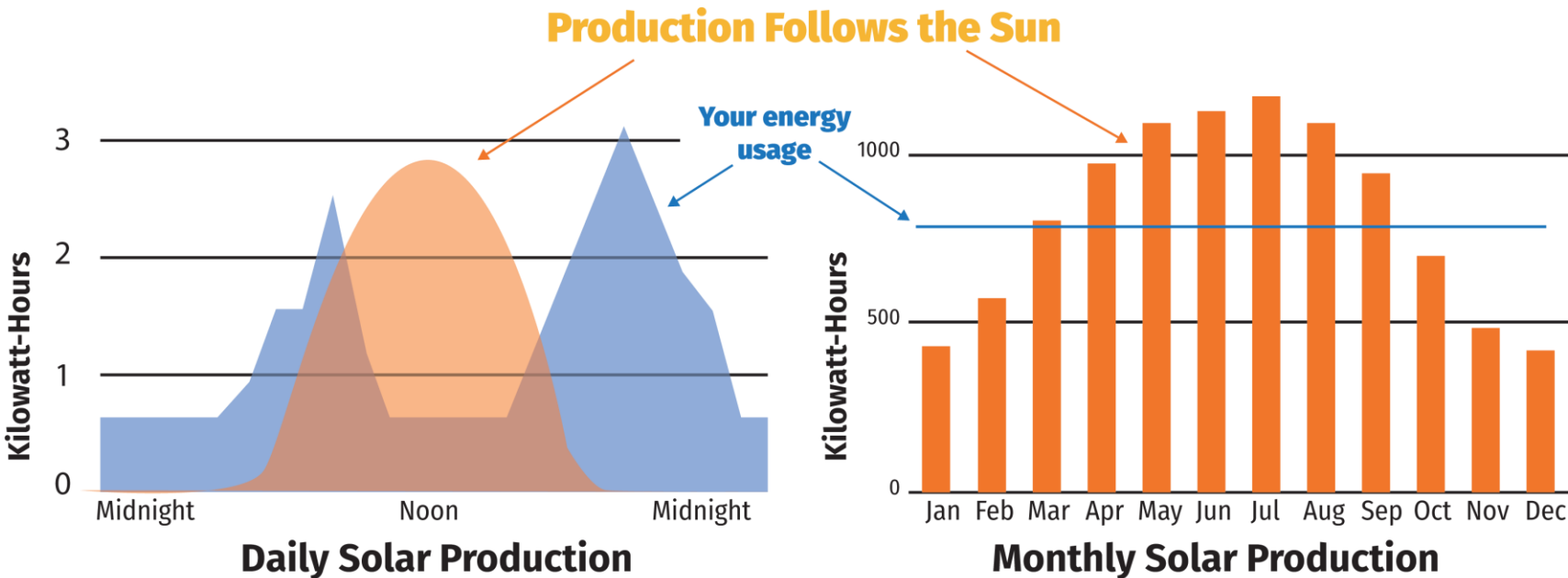


# Utility Policies

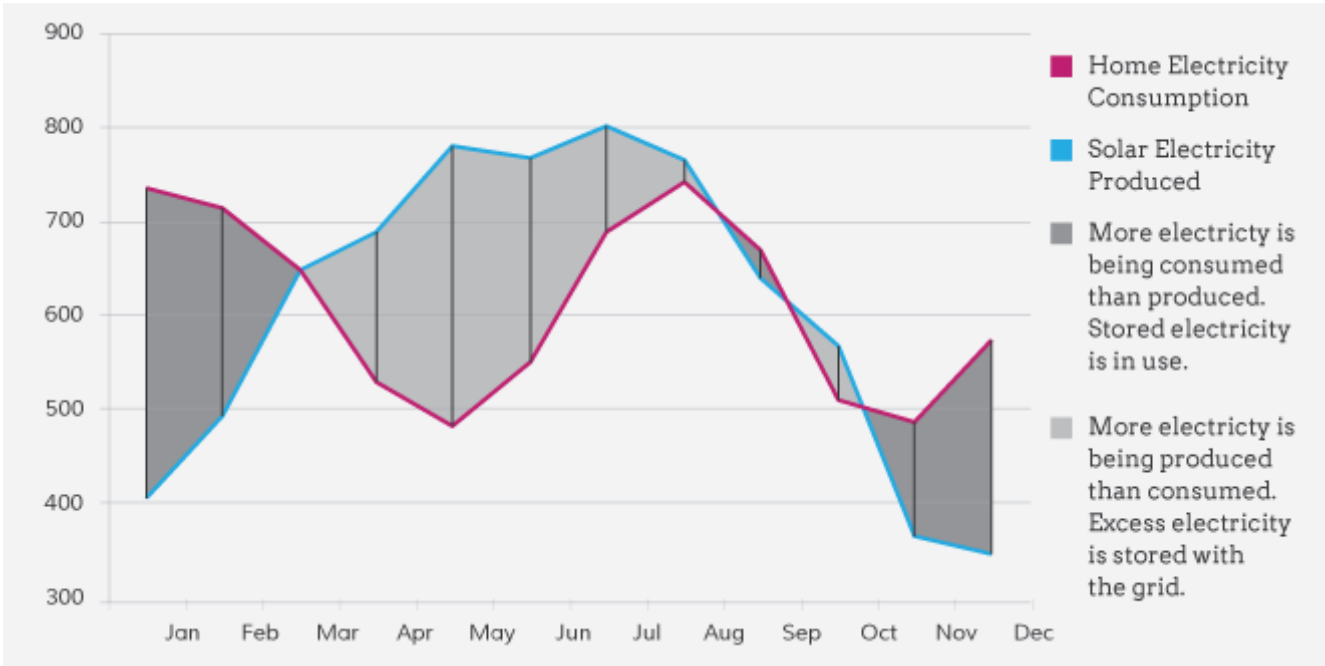
- Utility Policies Vary
- Net Metering



## Daily Balance

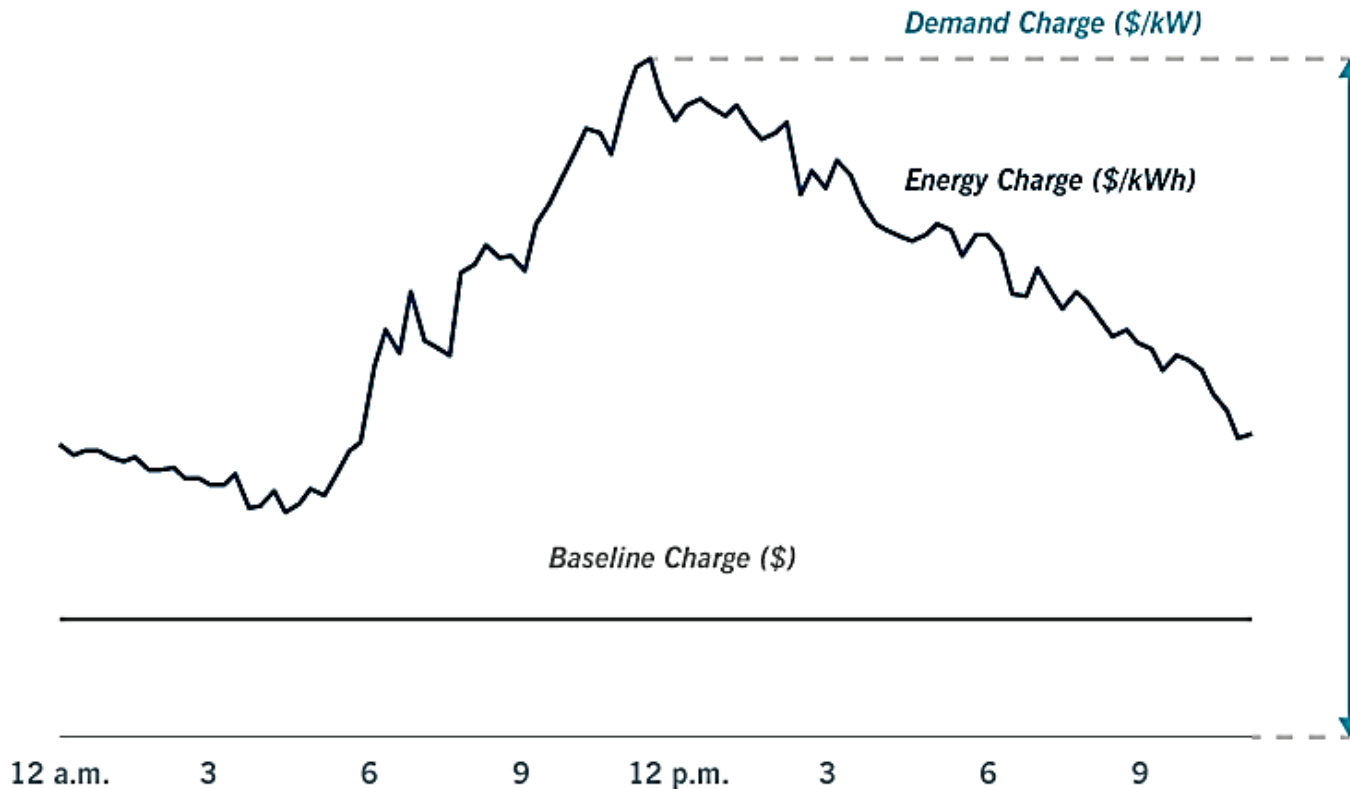


## Yearly Balance



# Utility Policies: Demand Charges

## Demand Charge Example



### ABC Utility Company

100 Electricity Circle  
Anycity, Anystate 23456

Your Local Company  
123 Sunshine Way  
Anycity, Anystate 23456

Billing Date: January 15, 2017  
Account Number: 1235678912  
Date Due: February 15, 2017  
Amount Due: \$8,312.73

#### Your Balance with Us

|                  |            |
|------------------|------------|
| Previous Balance | \$7,956.89 |
| Payments/Credits | \$7,956.89 |
| New Charges      | \$8,312.73 |

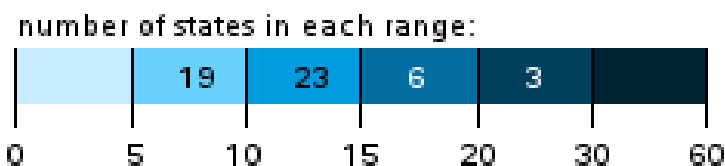
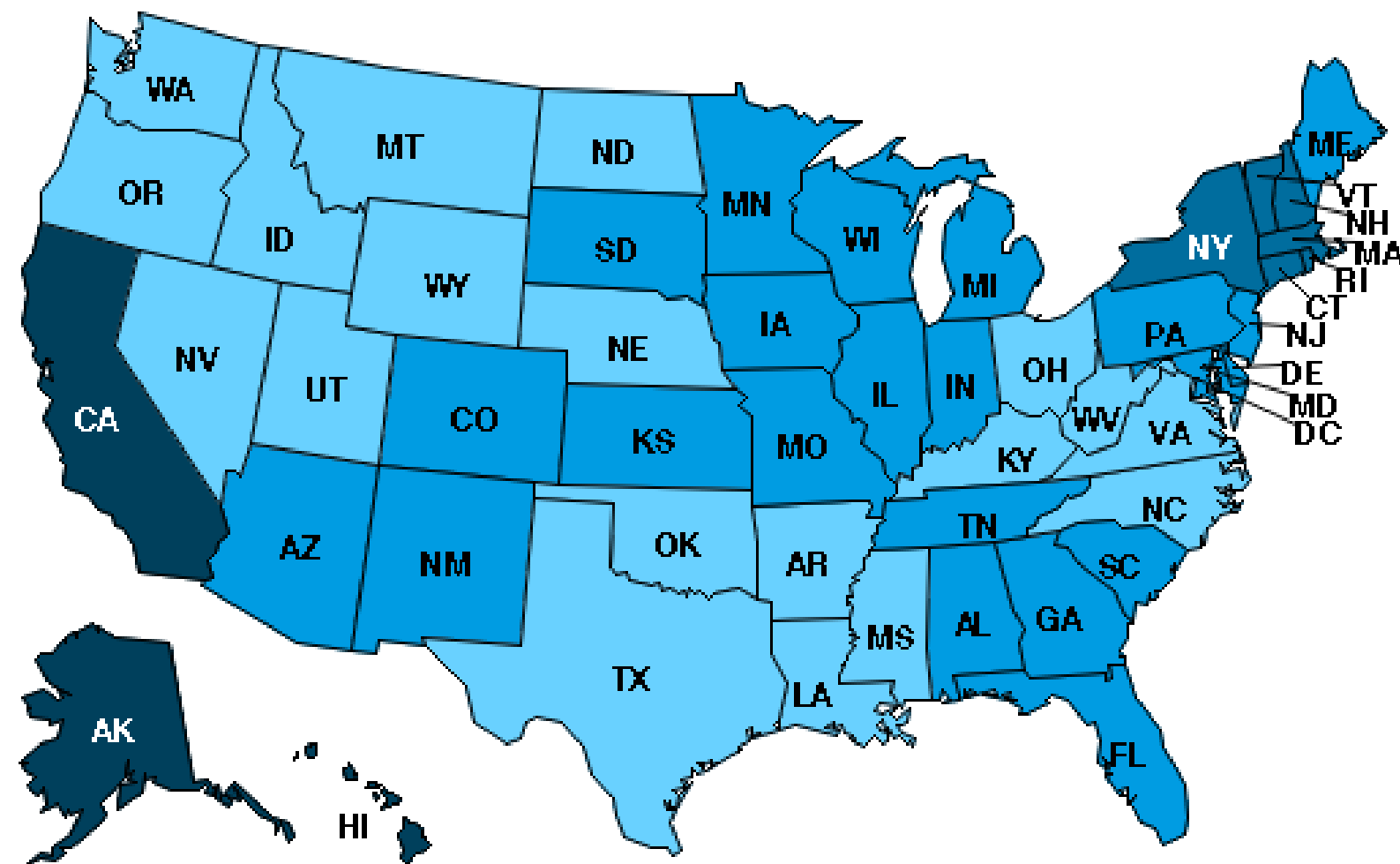
#### Payments Received

| Date       | Description      | Amount     |
|------------|------------------|------------|
| 12/15/2017 | Payment Received | \$7,956.89 |

| Meter Number | Service Period    | Elapsed Days | Meter Readings Previous | Current | Amount Used This Month |
|--------------|-------------------|--------------|-------------------------|---------|------------------------|
| 3456789      | 12/15/16- 1/15/17 | 31           | 70927                   | 94172   | 43,256 kWh             |
| 3456789      | Demand            |              |                         |         |                        |
|              | On-peak Demand    |              |                         |         | 500 kW                 |
|              | Off-peak Demand   |              |                         |         | 150 kW                 |

| New Charges               | Units                 | Cost Per Unit | Charge     |
|---------------------------|-----------------------|---------------|------------|
| Basic Charge (fixed fee)  |                       |               | \$23.00    |
| Electricity Consumption   | 23,245 kWh            | \$0.16253     | \$3,778.01 |
| Demand Charge - 15 min kW | Total Demand Charges: |               | \$4,306    |
| On-peak                   | 500 kW                | \$7.13        | \$3,565    |
| Off-peak                  | 150 kW                | \$4.94        | \$741      |
| Delivery Charge           | 23,245 kWh            | \$0.00619     | \$143.89   |
| Transmission Charge       | 23,245 kWh            | \$0.00266     | \$61.83    |
| Total Due                 |                       |               | \$8,312.73 |

# U.S. electric industry average revenue per kilowatthour June 2021, cents per kilowatthour



# Technical and Economic Feasibility of Solar

## Funding Options



# Funding Options: Cash Purchase

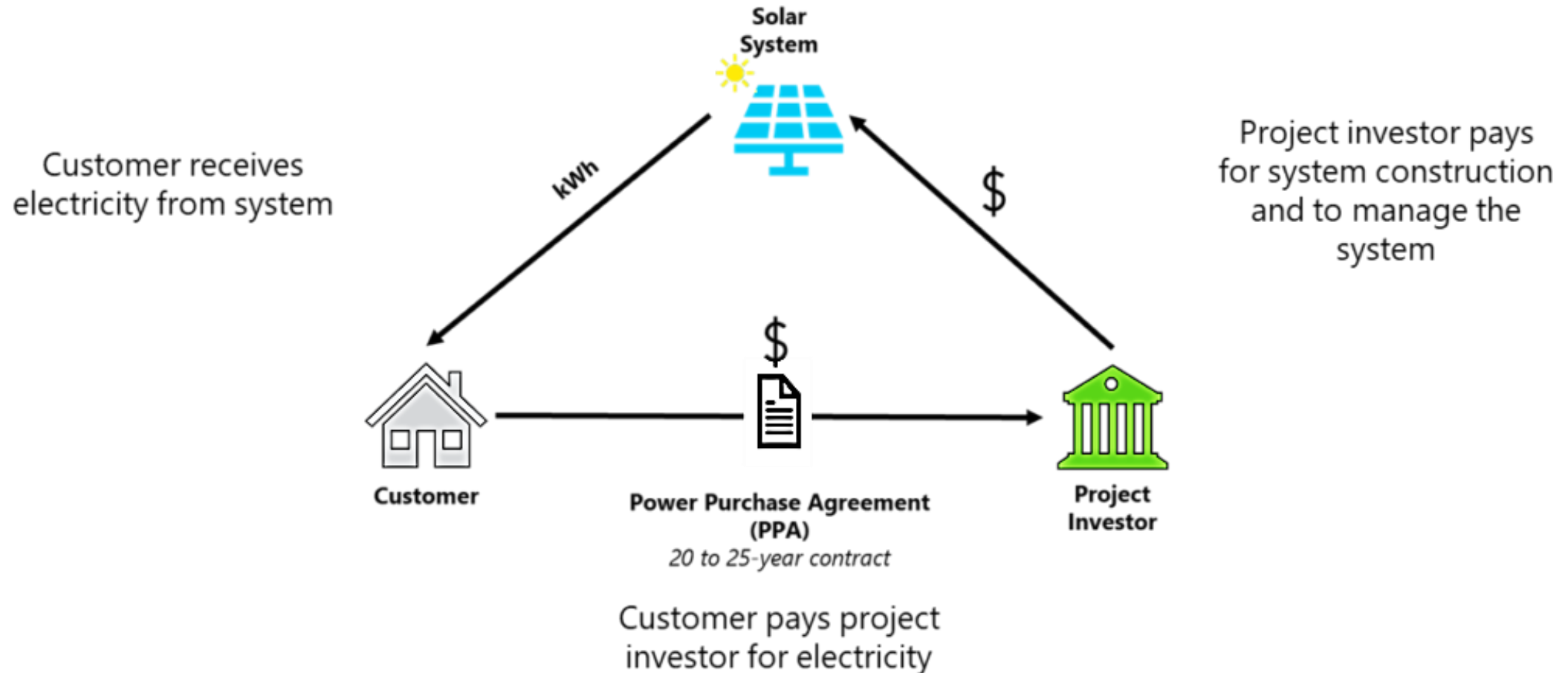
- Reserve Funds
- Private Funding/Partnerships

## Solar Capital Cost Rule of Thumb

\$1.5-2.5 per Watt

# Funding Options: Power Purchase Agreement

Simple Diagram of a Solar PPA



# Funding Options: Loan

- State Revolving Fund Loan
  - Energy Conservation & Renewable energy
  - Eligible under Drinking and Clean Water Programs
  - 1.75% Interest Rate
  - 0.5% Origination Fee
  - 0.25% Annual Servicing Fee
  - Environmental Review

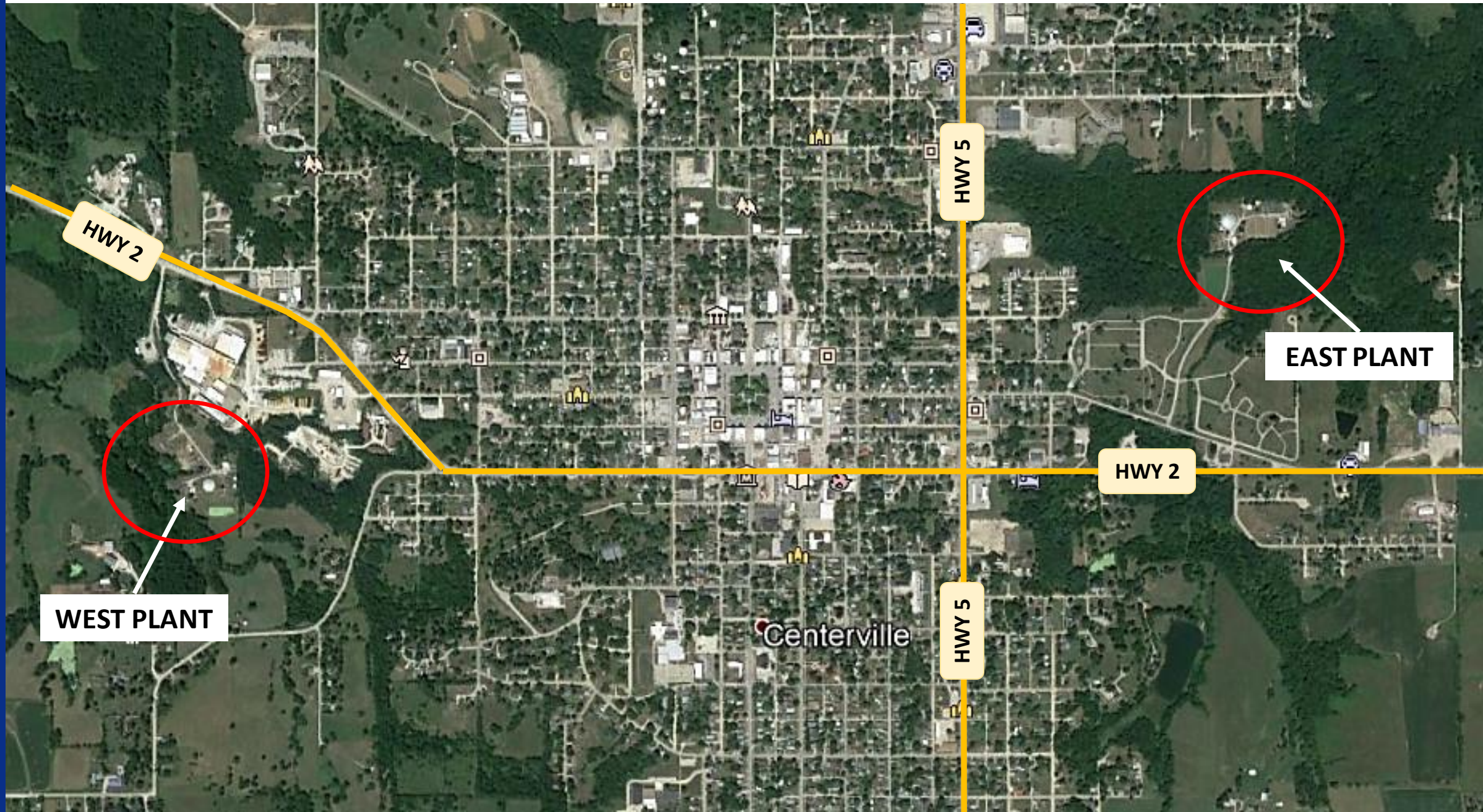


**A SOURCE** of funding for your drinking water and wastewater projects. Get started with low-interest loans for a cost-effective way to complete your improvements.

# Case Study: City of Centerville



# Case Study: Centerville,



# Case Study: Centerville, IA

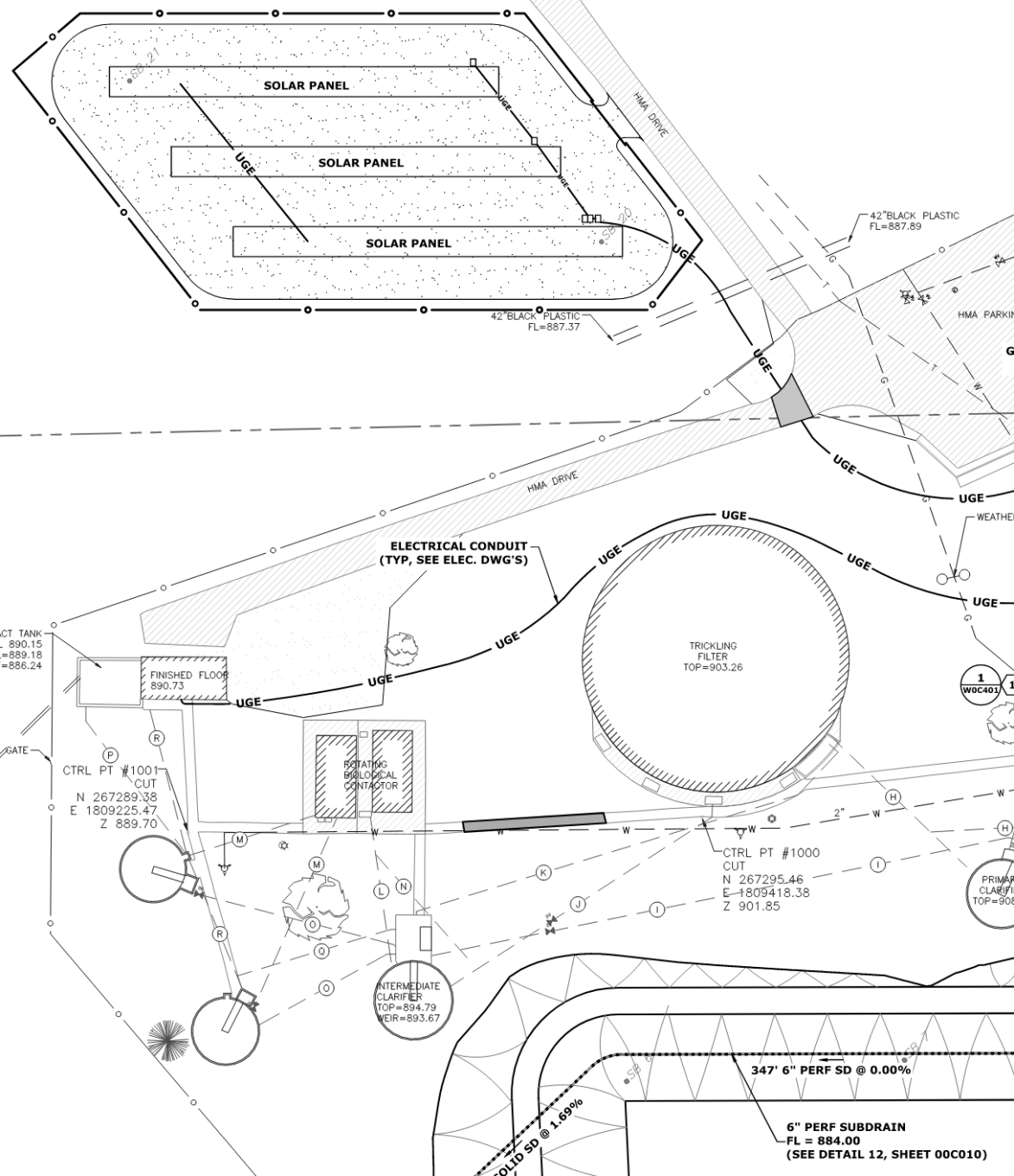
WEST TREATMENT PLANT



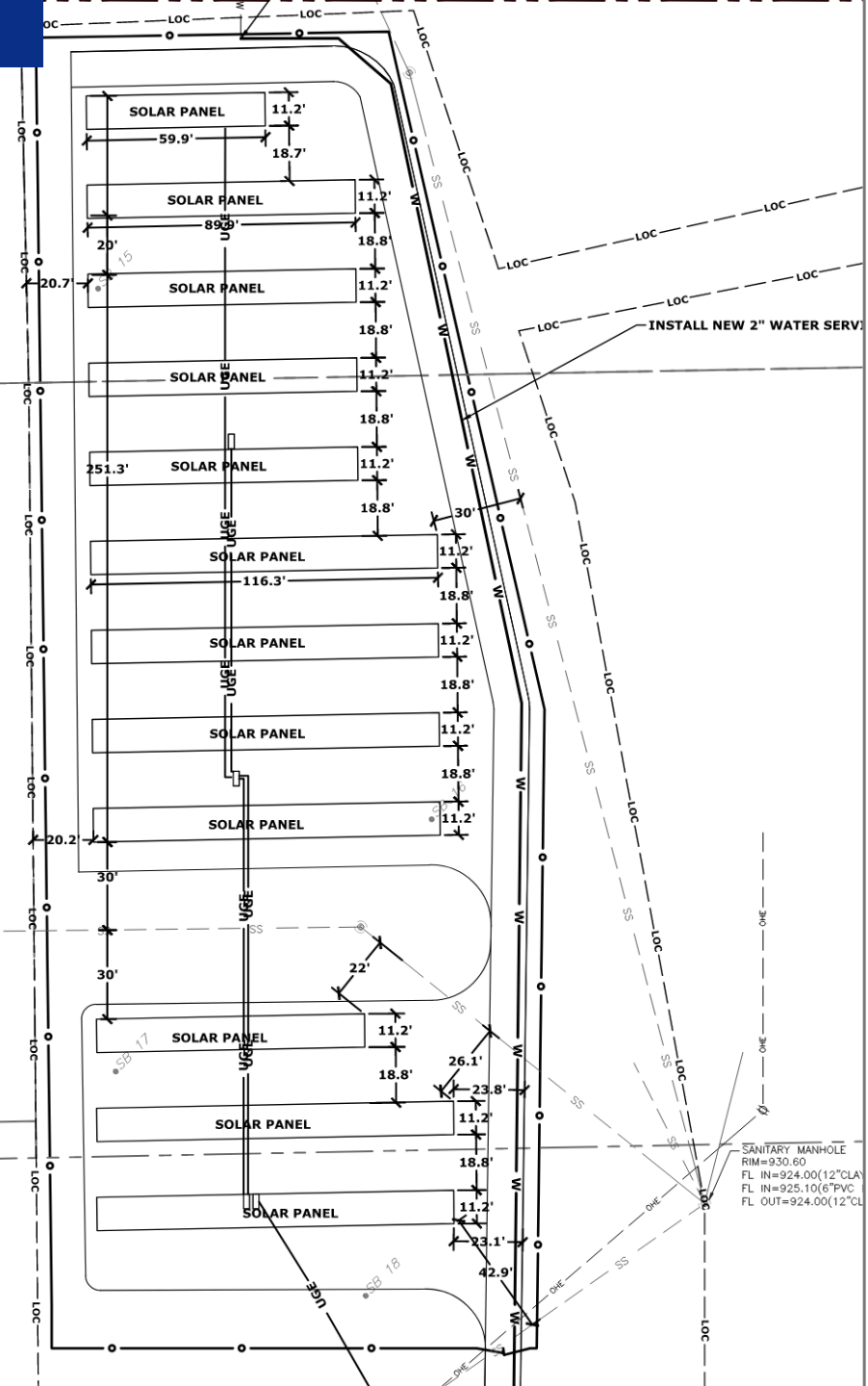
EAST TREATMENT PLANT



## WEST PLANT



## EAST PLANT



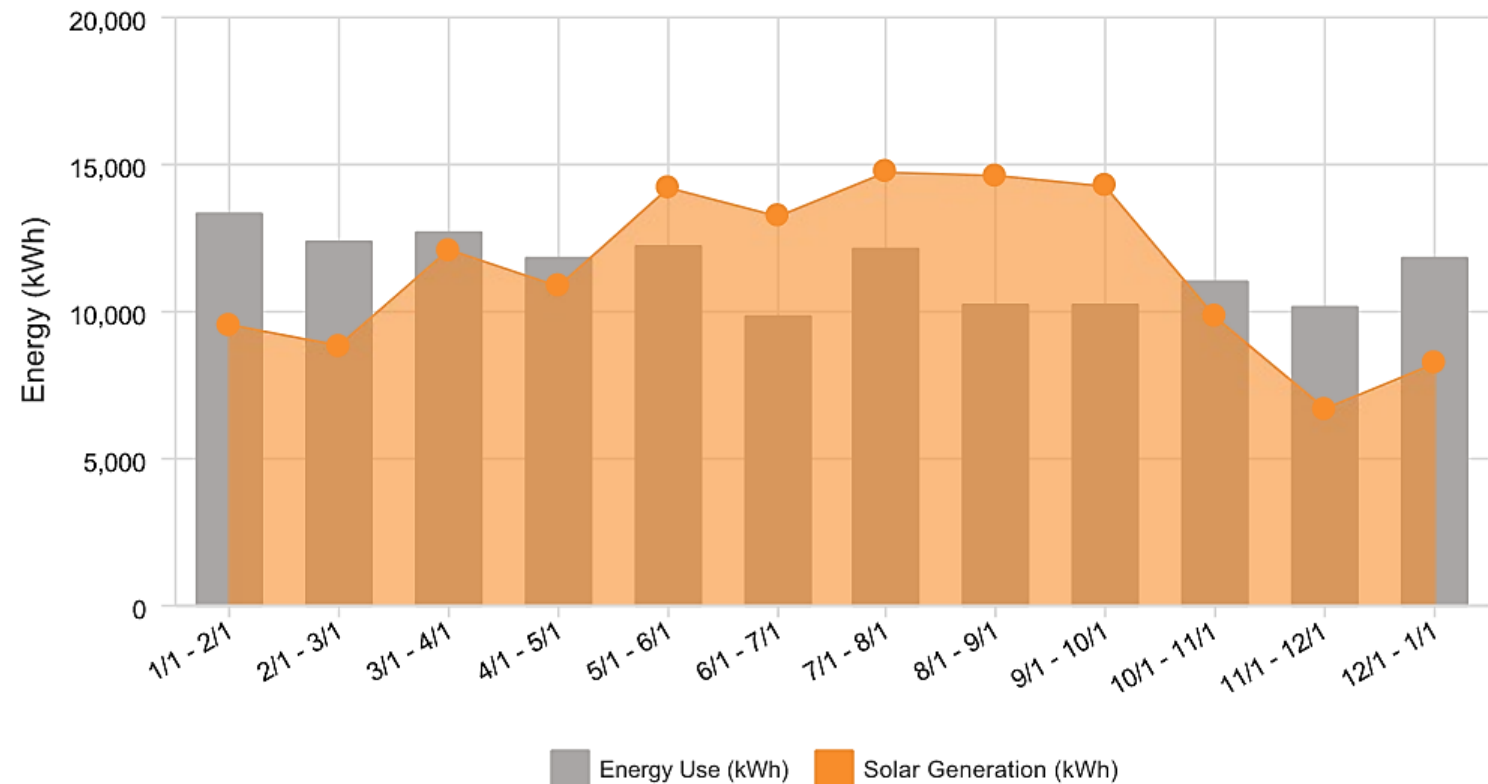
# Case Study: Centerville, IA

- Sizing
  - Existing Utility Bills
  - Future Usage
- Design
  - Net Zero Metering
  - Alliant Requirements
- Layout

**West Plant: 104 kW**

**East Plant: 295 kW**

Monthly Energy Use vs Solar Generation



# Case Study: Centerville, IA

## Planning Level Evaluation

### Costs

- \$1,120,000 for both systems
- 400 KW system total

### Assumptions

- 0.5% Annual Solar Capacity Loss
- 20-yr Extended Warranty on Inverters
- Maintenance Contract at 20-years
- \$0.15/kWh Energy Cost
- 3% Annual Energy Cost Inflation
- 100% power offset

# Case Study: Centerville, IA

## Planning Level Evaluation

### Cash Purchase

- No interest
- Savings increase annually due to annual energy cost inflation
- Immediate Savings due to 100% power cost offset

### Loan Purchase

- Increased Loan to Pay for System
- SRF Loan with 1.75% Interest Rate
- 20-year Loan Term
- Annual P+I Payment < Annual Energy Costs

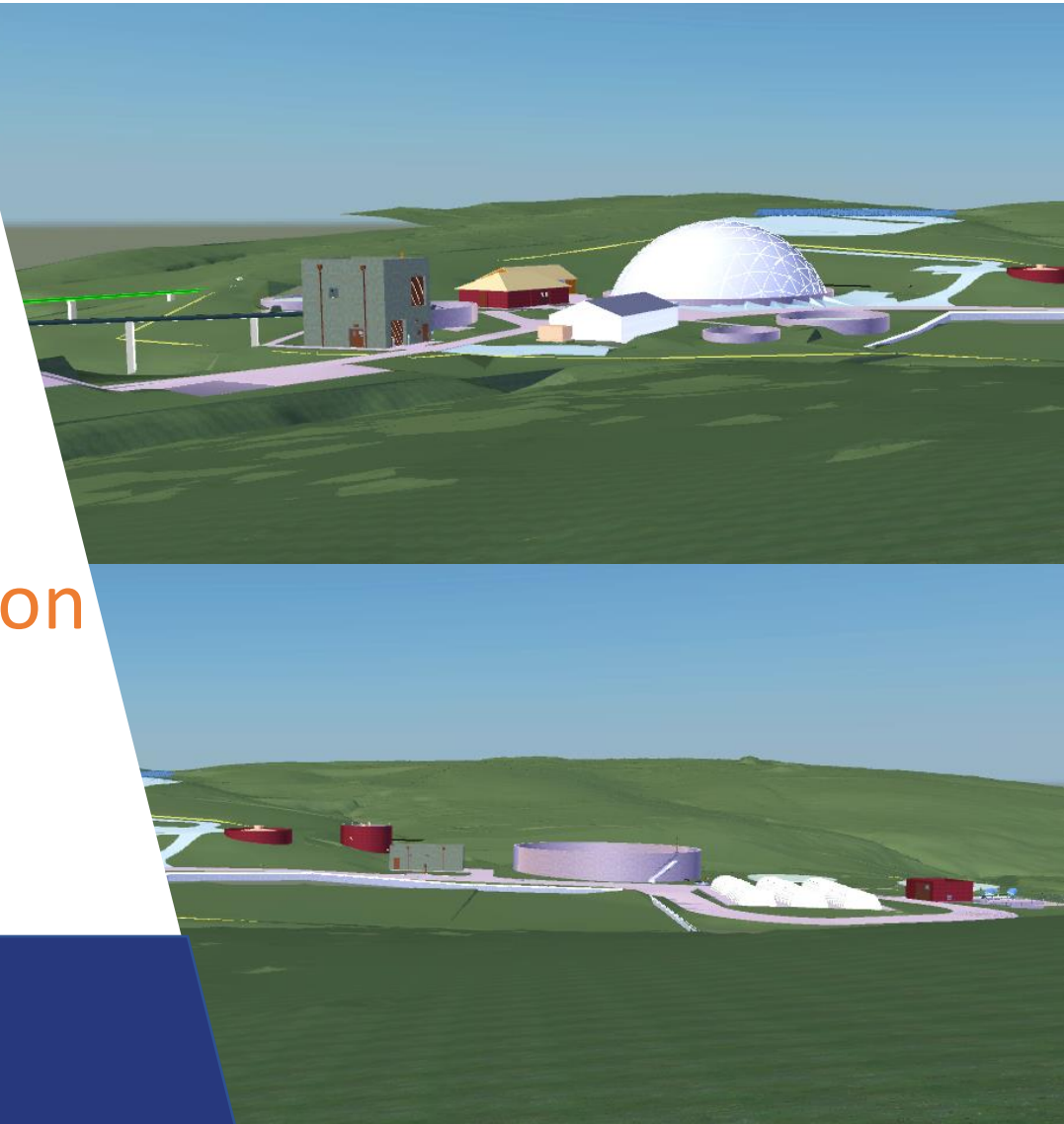
# Case Study: Centerville, IA

## Planning Level Evaluation (future dollars)

| Parameter         | Cash        | Loan        |
|-------------------|-------------|-------------|
| Payback Period    | 13 Years    | 20 years    |
| 20-yr Net Savings | \$928,000   | \$641,000   |
| 30-yr Net Savings | \$2,280,000 | \$1,993,000 |
| 40-yr Net Savings | \$3,798,000 | \$3,510,000 |

# Case Study: City of Centerville

Perspectives from City Administration  
Jason Fraser  
Centerville, IA





# Thank you for your time!

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