

WOODBURY COUNTY BOARD OF SUPERVISORS AGENDA ITEM(S) REQ

10

Date: March 13, 2015

Weekly Agenda Date: March 31, 2015

DEPARTMENT HEAD / CITIZEN: Rick Schneider, Conservation Director

SUBJECT: Solar Renewable Energy Projects for Little Sioux Park and Dorothy Pecaut Nature Center

ACTION REQUIRED:

Approve Ordinance

Approve Resolution

Approve Motion

Give Direction

Other: Informational

Attachments

WORDING FOR AGENDA ITEM: Request for Conservation Board to proceed with issuing a Request For Proposals to supply the Conservation Board with turnkey installation of a photovoltaic solar facility within two county parks.

EXECUTIVE SUMMARY: The proposed solar energy project(s) will require approval of a long term lease which must be approved by the Board of Supervisors.

BACKGROUND: The Conservation Board has been working with a solar consultant to determine the best options for installation of solar powered electric generating facilities in county parks. A Due Diligence Report has been completed along with a form of RFP. Financing for such a project will require a type of long term lease with a private investment company/group (7-12 years). Long term leases require approval of the Board of Supervisors. Solar energy projects are being proposed for consideration at Little Sioux Park and Dorothy Pecaut Nature Center since both areas are served by Mid-American Energy and long term net metering can be obtained for optimal payback.

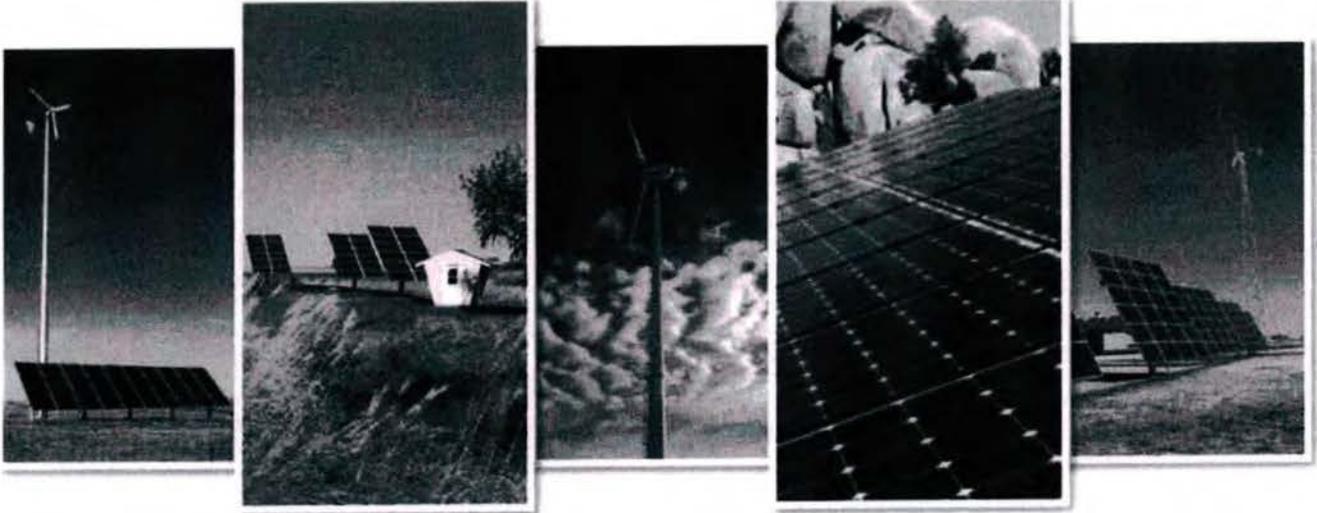
FINANCIAL IMPACT: Our electric utility bills for these areas are a major expense and are expected to increase at a rate of 5% annually the next several years. Installation of solar units to generate electricity for each area will require a long term lease with an outside company that will provide us the opportunity to reduce our electric costs by approximately 10% per year. At the end of the lease, we would have the opportunity to renegotiate the terms of the lease or purchase the solar equipment and reduce electricity costs to nearly zero. The leases typically require no money down. All equipment maintenance is the responsibility of the leaser. The County provides the real estate for installation.

RECOMMENDATION: Allow the Conservation Board to proceed with issuing the Request For Proposals.

ACTION REQUIRED: Motion to allow the Conservation Board to issue Request For Proposals for complete installation of photovoltaic solar facilities within two county parks.

Due Diligence Report

Woodbury County Conservation Board



Presented By:
Rob Hach, President
January 8, 2015



WIND AND SOLAR SPECIALISTS
WORLDWIDE RENEWABLE ENERGY SERVICES

Worldwide Renewable Energy Services

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DISCLAIMER

This report is presented in response to the contract between Woodbury County Conservation Board and Wind and Solar Specialists (WASS) executed on November 6, 2014. The information and analyses presented herein is based on solar development best practices, commercially available information and analyses of the Woodbury County Conservation Parks. WASS makes no guarantees, expressed or implied as to the actual outcome of the processes described in this report.

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Wind and Solar Specialists – It's what we do

Company Overview:

Mission Statement

- We are dedicated to providing solution focused wind and solar services with a commitment to building strong customer relationships one project at a time.
- We achieve this by consistently providing value based renewable energy services domestically and internationally.
- We accomplish this by focusing on value to our customers, investing in our employees and building strong vendor partnerships to produce solid profits.

Background

Welcome to Wind and Solar Specialists (WASS). Based out of Alta, Iowa, we can fulfill all of our customers' renewable energy needs. With over 100 years of combined experience constructing and maintaining renewable energy projects in virtually any terrain or weather conditions, we have the experience to do the job right the first time.

Wind and Solar Specialists has been installing renewable equipment since 2002. The company has been involved in over 2,000 renewable energy projects. Each renewable energy project is thoroughly planned and supervised. In addition to our standard services we can provide the following customer services: equipment sales, equipment installation, data collection, quality control, data analysis, professional meteorological certified reporting, equipment procurement, and site assessment.

Area Operation

Site Assessment:

Anemometry Specialists, Inc. (ASI) is the parent company of Wind and Solar Specialists. ASI provides wind energy site assessment services to utility scale wind farms. The selection of a wind turbine site is crucial to the profitability of a wind project. The availability of wind, transmission lines, value of energy to be produced, cost of land acquisition, land use considerations, and environmental impact of construction and operations can have a major impact on potential profits. The same attention to detail that is applied to the large scale wind farms is applied to every one of Wind and Solar Specialists projects.

Typical site location services include:

- Site Visits
- Evaluation of Topography
- Land Use and Ownership
- Compilation of Existing Renewable Resource Data

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Turbine and/or Solar Maintenance and Repair:

Periodic wind turbine and solar array inspections and maintenance can prevent more costly repairs due to system failures and help ensure reliable energy production. A visual inspection of all turbine array equipment, cabling and grounding systems can prevent lost energy production and save you money.

Wind and Solar Specialists provides fully documented inspections and maintenance including digital photos. Maintenance inspections are usually scheduled to coincide with other tower projects. We are always ready to help in the event of an unexpected problem.

Data Analysis

One of the most important steps in the development of a potential wind or solar site is the collection of accurate and verifiable atmospheric data. Anemometry Specialists possesses extensive experience in coordinating, designing and installing wind and solar projects. Accurate resource data is essential for determining an accurate return on investment for our customers.

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Due Diligence Report Findings

Project Constraints

Project constraints or prospective constraints are components of the development of a project that could impact the return on investment and thus the success of a wind or solar project. The most common known constraints that most projects could potentially encounter are as follows:

1. Renewable Resource – Is the resource sufficient to make the economics work?
2. Project Siting – What is the optimal location of the renewable project based on the renewable resource?
3. Environmental – Will the project have a negative environment impact or are environmental constraints present?
4. Utility Interconnection - Is the electric utility receptive to the interconnection of a wind or solar project on their system?
5. Permitting – Different states, counties, and townships may require different permitting for the development of a project. Will permitting impact the development of the renewable energy project?
6. Zoning – Height restrictions, setback restrictions, building class restrictions can all impact the development of a project.
7. Economic Return – Do the numbers make sense is what it all boils down to.
8. Financing models – How does everything get paid for? If no constraints exist or the constraints are not an impediment and while the economic return makes a project viable, how is everything paid for?

Each of the potential project constraints are discussed and analyzed in the following report. Information has been gathered from the best available resources at the time of this report.

A summary of the findings will be found at the end of the report along with a conclusion and recommendation as to what Woodbury County Conservation should do in regards to the development of the renewable energy resource within the surveyed parks.

Woodbury County Conservation selected to have five parks surveyed and reviewed for the prospect of converting the specified parks to renewable electric resources to further promote the Conservation Board's environmental stewardship initiatives. The specific parks are as follows:

1. Brown's Lake Park in Salix, Iowa.
2. Little Sioux Park in Correctionville, Iowa.
3. Dorothy Pecaut Nature Center in Sioux City, Iowa.
4. Snyder Bend Park in Salix, Iowa.
5. Southwood Conservation Area in Smithland, Iowa.

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1. Renewable Resource

Siting Analysis:

To find accurate energy production for a specific location, early-stage siting of renewable energy systems must minimize aspects that can pose a potential negative impact on production while mitigating technical hurdles. WASS uses current industry standards to accurately gauge the available resources at the specific location.

Solar Resource:

A summary of the solar electric resource throughout the five parks was somewhat consistent with only an overall variation of 3% between all of the parks. Park level specific solar resource information can be found in the appendix. Woodbury County has an average of 4.8 sun-hours a day and is in the top tier of solar electric energy resource in the state.

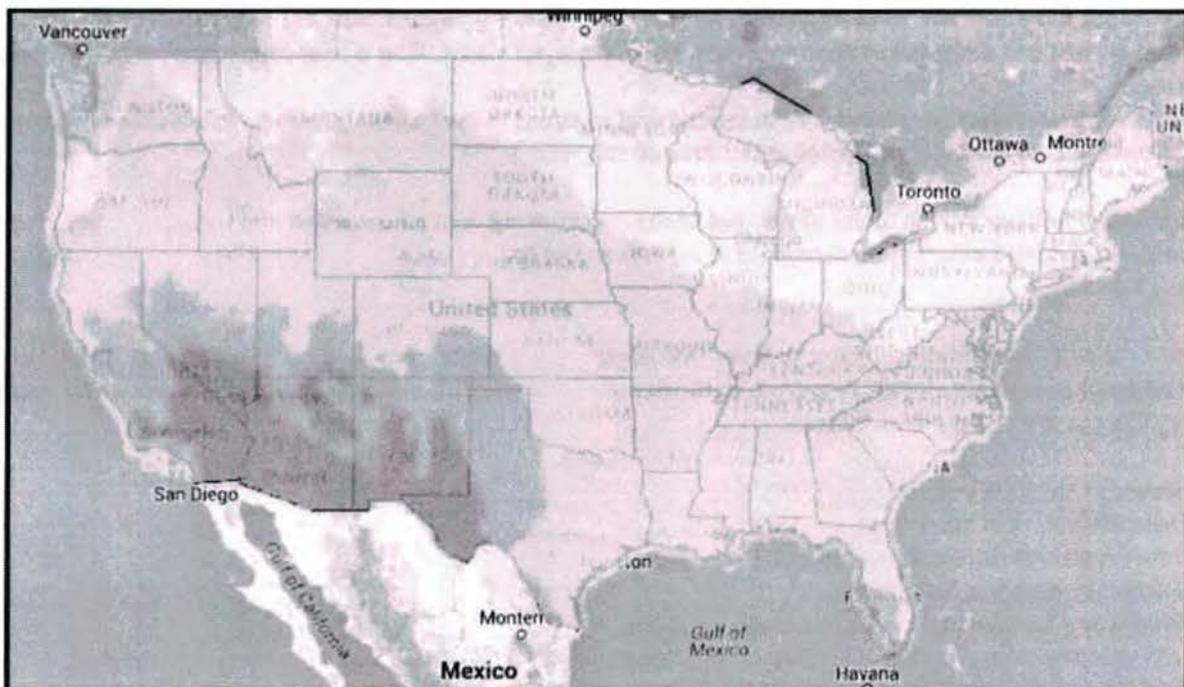
Solar Resource Maps:

Avg. Annual GHI (kWh/m²/day)

- ✓ 2.0 to 2.5
- ✓ 2.5 to 3.0
- ✓ 3.0 to 3.5
- ✓ 3.5 to 4.0
- ✓ 4.0 to 4.5
- ✓ 4.5 to 5.0
- ✓ 5.0 to 5.5
- ✓ 5.5 to 6.0
- ✓ 6.0 to 6.5
- ✓ 6.5 to 7.0
- ✓ 7.0 to 7.5
- ✓ 7.5 to 8.0
- ✓ 8.0 to 8.5

Solar Resource Scale – Lowest solar electric production at the top and the highest is at the bottom.

Map 1



Nationwide solar electric resource

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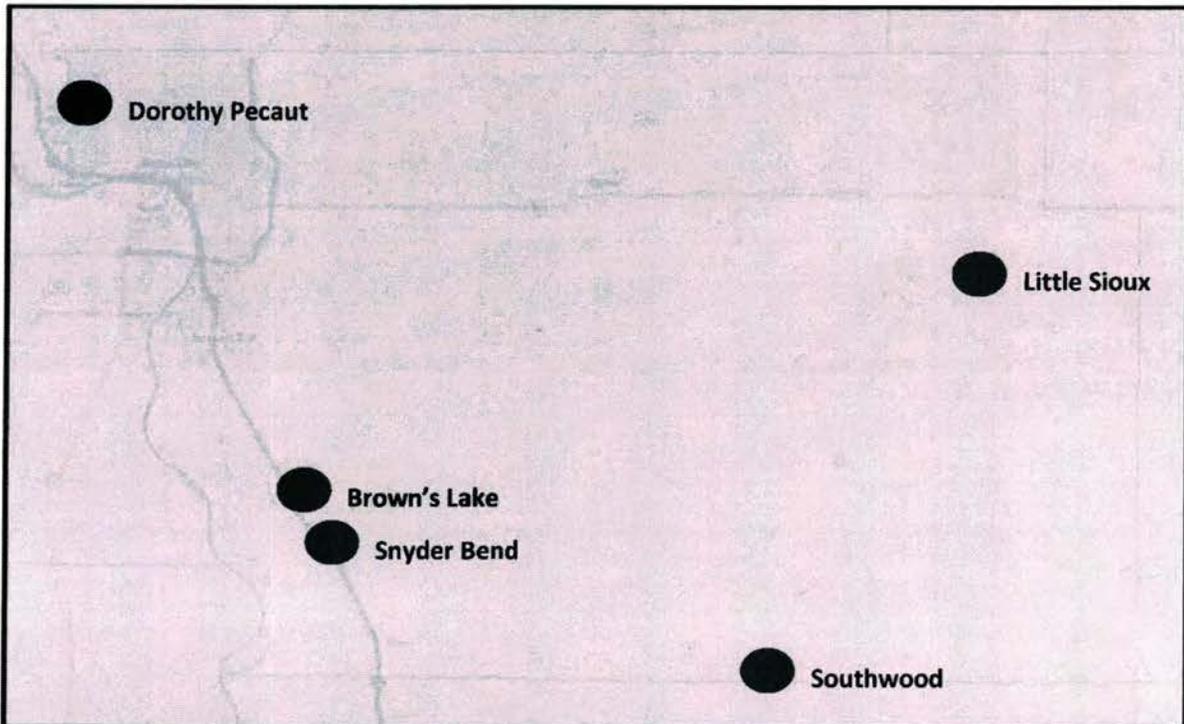
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Map 2



State of Iowa Solar Electric Resource

Map 3



Woodbury County Solar Electric Resource

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Wind Resource:

The wind resource in Woodbury County was diverse across the five parks with as much as a 14% variation between the parks. Park level specific wind resource information can be found in the appendix. Woodbury County has an annual average wind speed of 7.8 mph and is in the middle to lower tier of wind electric energy production in the state.

Wind Resource Maps:

Wind Power Class (Exclusions Applied) (Power Class/Potential)

- Class 3
- Class 4
- Class 5
- Class 6
- Class 7

Wind Resource Scale – Lowest wind electric production at the top and the highest is at the bottom.

Map 4

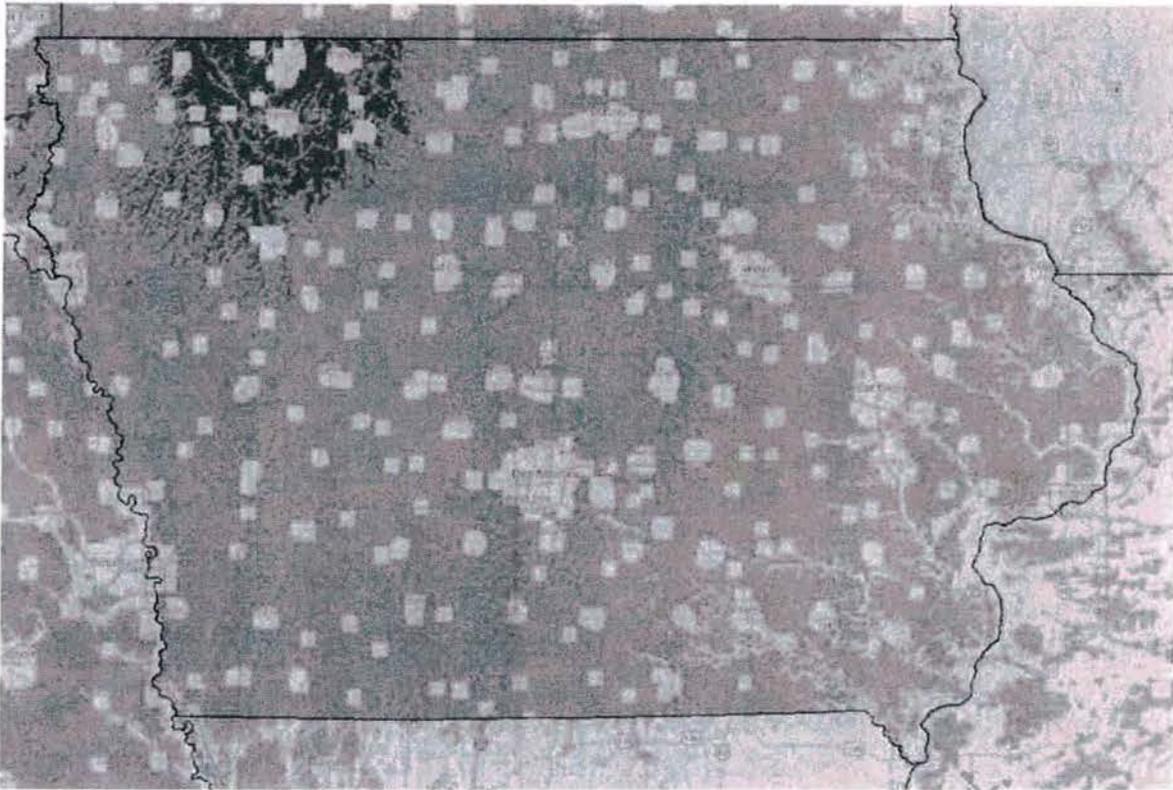


Nationwide wind electric resource

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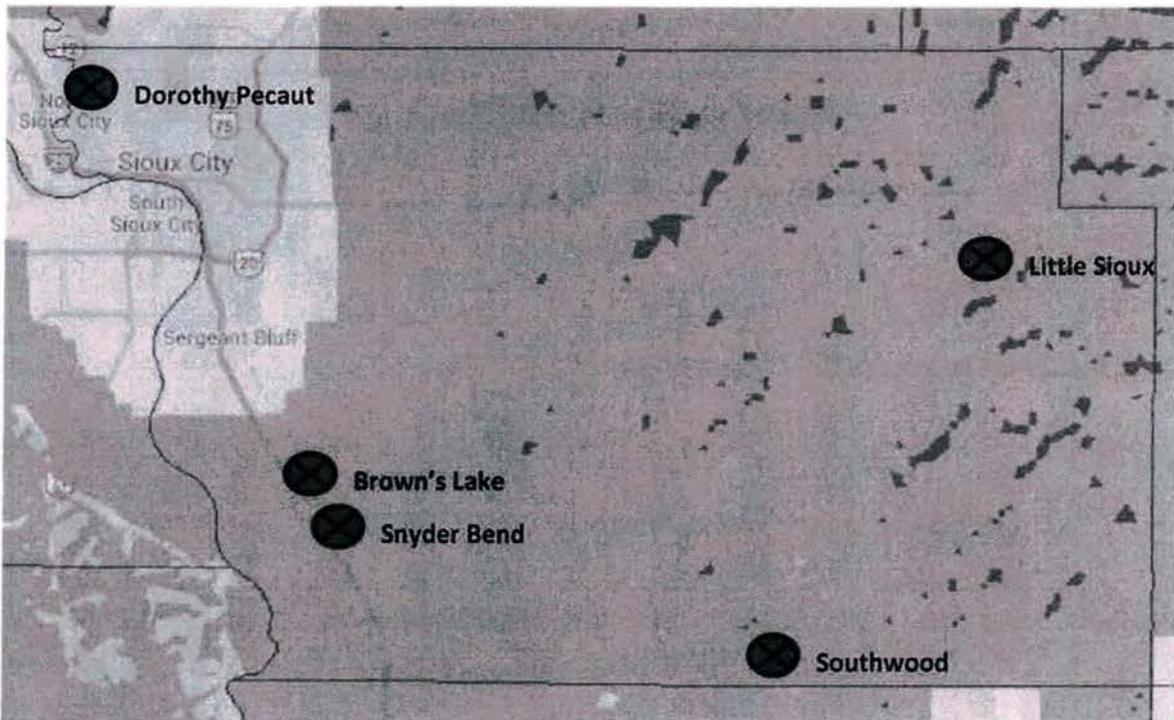
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Map 5



State of Iowa Wind Electric Resource

Map 6



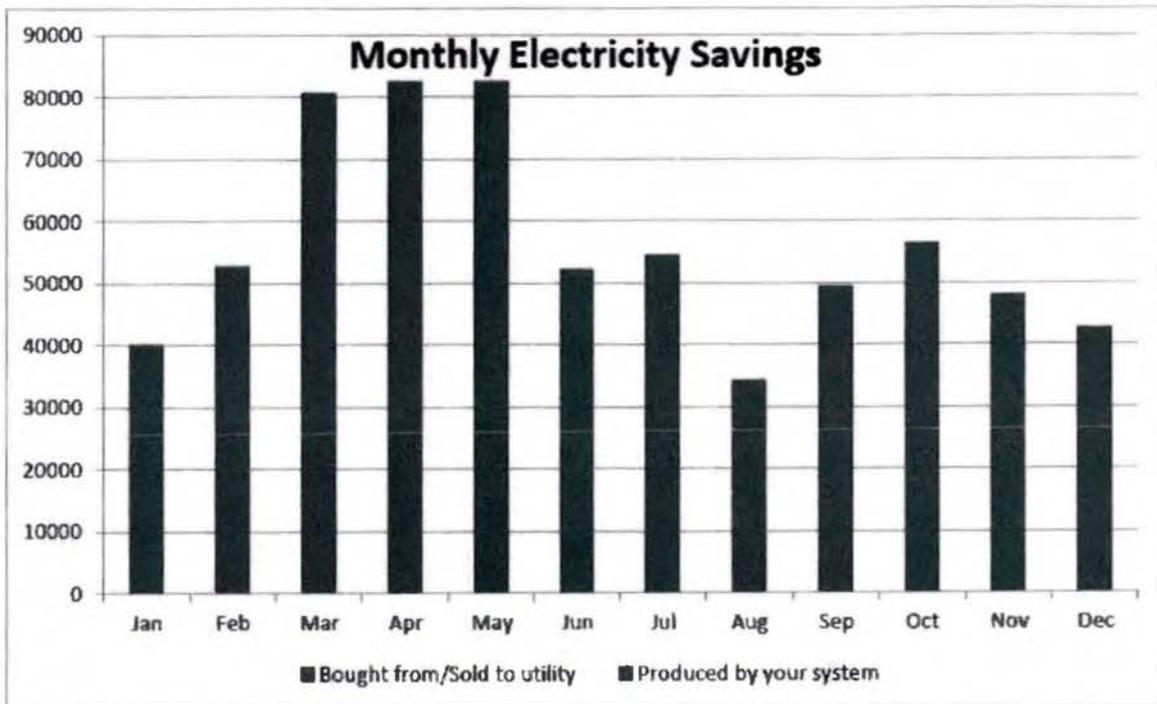
Woodbury County Solar Electric Resource

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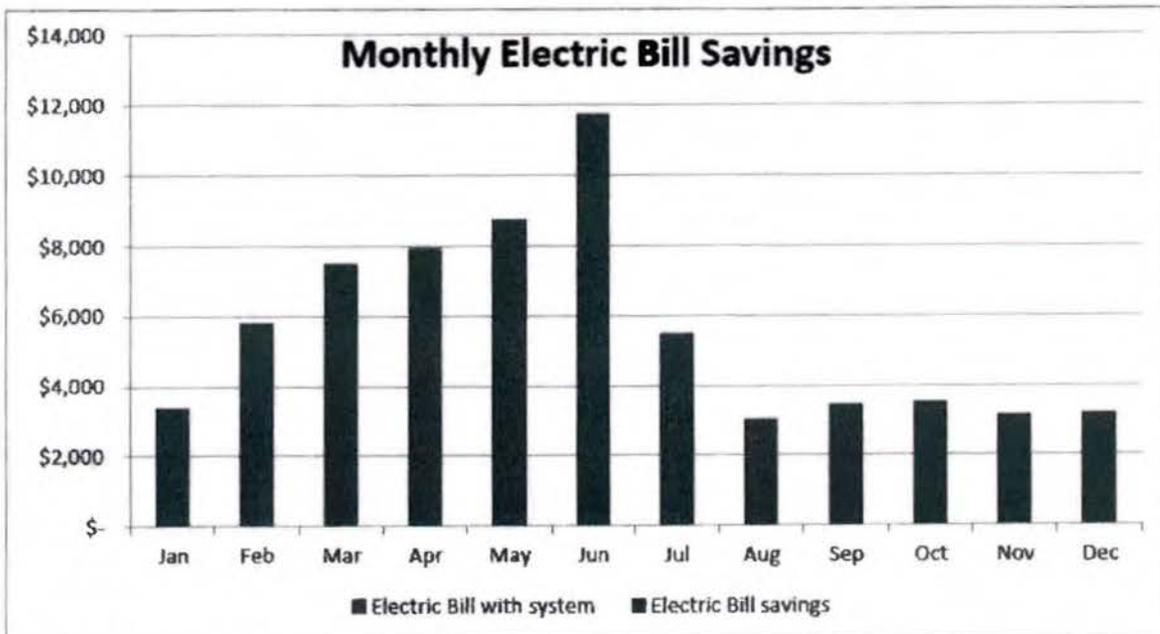
Woodbury County Conservation's Five Surveyed Parks Electrical Load Analysis:

Graph 1



Kilowatt Hour usage across all five parks.

Graph 2



Electric cost across all five parks.

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Electrical Usage Summary:

The five surveyed parks use 677,447 kilowatt hours annually and has a cost of \$67,128 for the electricity. The average cost of electricity is \$.09 and a monthly average electric bill of \$5,594. The monthly average electric usage is 56,453kWh.

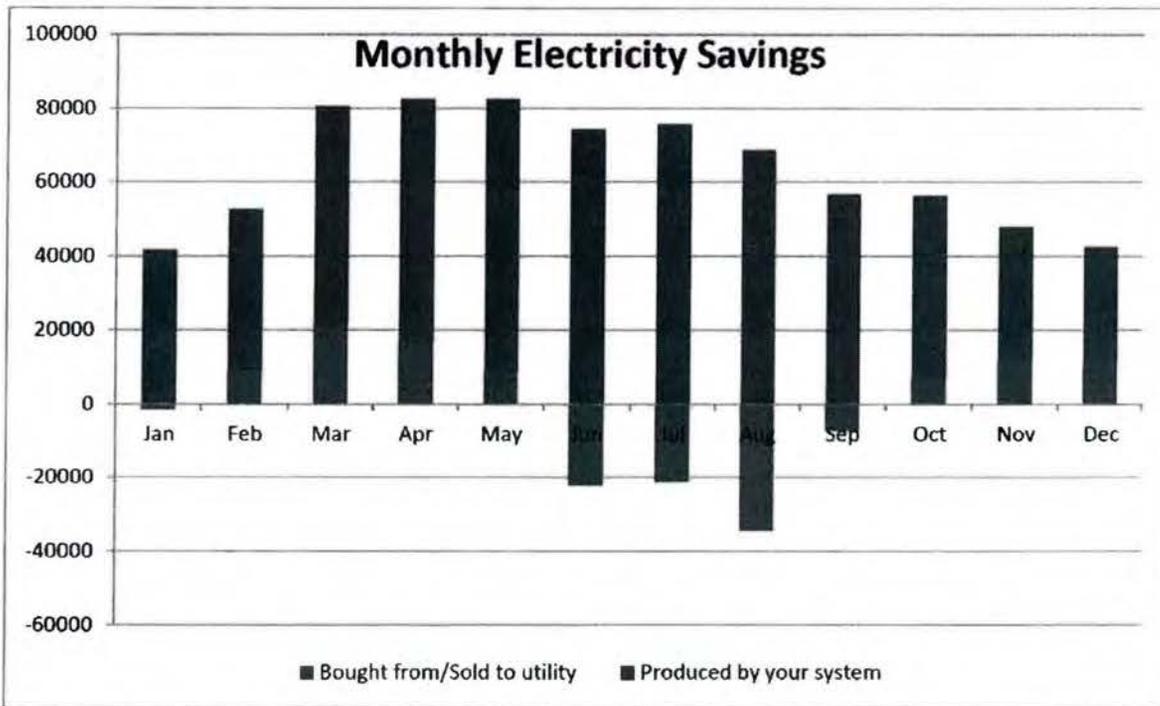
Table 1

Total	677,447	\$	-	\$	-	\$	67,128.93
Meter 1 Avg \$/kWh						\$	0.0991
Meter 1 Average Bill per month						\$	5,594.08
Meter 1 Average kWh per month							56453.91667

Electrical Production in Relation to Electrical Load by Resource:

Solar:

Graph 3

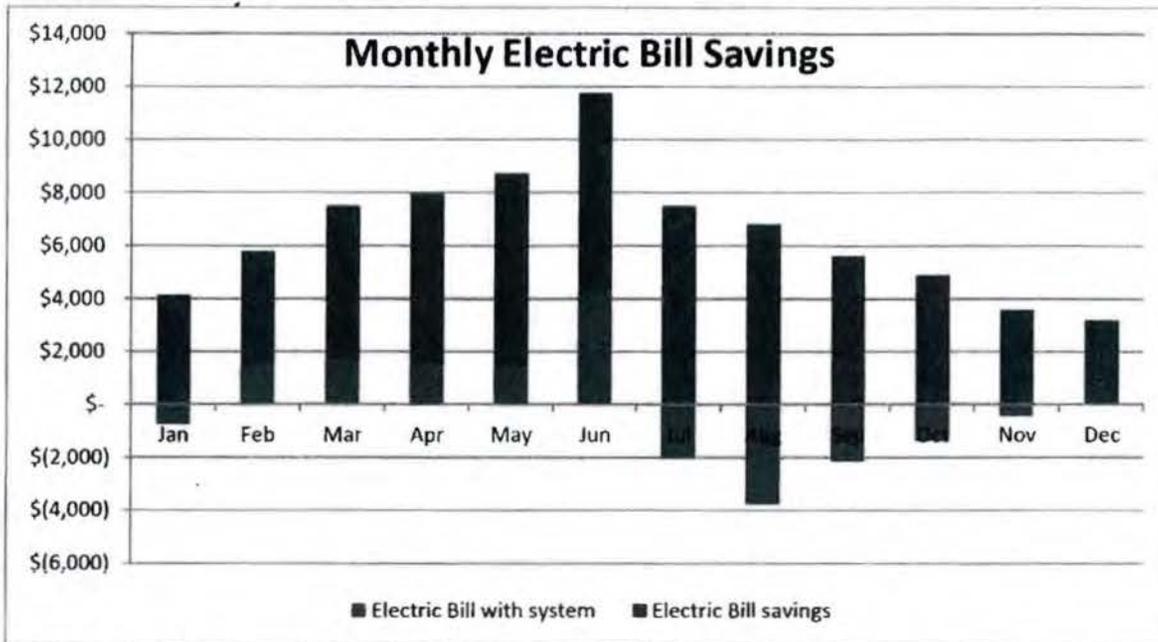


Kilowatt hours produced by solar in relation to the electrical load of the parks.

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Graph 4



Electric cost offset by solar electric energy production.

Table 2

Wind Solar Specialists
Worldwide Renewable Energy Services

Month	Solar Generation	Total Generation	Old Load	New Load	Bill Savings	Old Bill	New Bill
Jan	41815	41815	40278	-1537	\$ 4,143.46	\$ 3,397.56	\$ (745.90)
Feb	43989	43989	52841	8852	\$ 4,358.92	\$ 5,808.95	\$ 1,450.03
Mar	58960	58960	80757	21797	\$ 5,842.43	\$ 7,520.92	\$ 1,678.49
Apr	65694	65694	82646	16952	\$ 6,509.66	\$ 7,951.97	\$ 1,442.31
May	73967	73967	82633	8666	\$ 7,329.50	\$ 8,754.91	\$ 1,425.41
Jun	74510	74510	52296	-22214	\$ 7,383.26	\$ 11,770.16	\$ 4,386.90
Jul	75926	75926	54633	-21293	\$ 7,523.63	\$ 5,512.02	\$ (2,011.61)
Aug	68856	68856	34403	-34453	\$ 6,823.00	\$ 3,053.48	\$ (3,769.52)
Sep	56948	56948	49582	-7366	\$ 5,642.99	\$ 3,473.57	\$ (2,169.42)
Oct	49466	49466	56505	7039	\$ 4,901.69	\$ 3,522.94	\$ (1,378.75)
Nov	36210	36210	48124	11914	\$ 3,588.13	\$ 3,160.86	\$ (427.27)
Dec	31593	31593	42749	11156	\$ 3,130.61	\$ 3,201.59	\$ 70.98
Total	677935	677935	677447	-488	\$ 67,177.28	\$ 67,128.93	\$ (48.35)

Solar Resource data

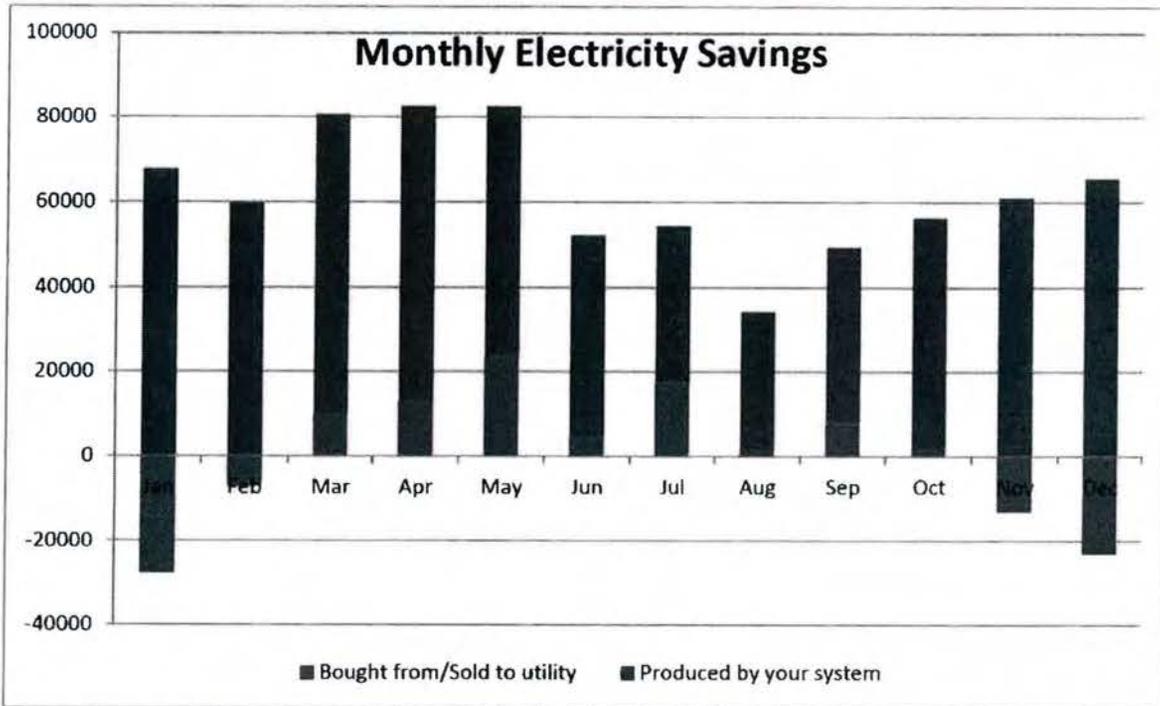
The solar resource was estimated from the National Renewable Energy Laboratories' PVWatts calculator. The analysis was conducted using data from SIOUX CITY, IA. The system is designed to be 1 at a Standard degree angle, facing Fixed (open rack) from North. The expected generation is 1,384 kWh/kW DC per year. This results in 677,935kWh being generated every year covering 100% of your power needs.

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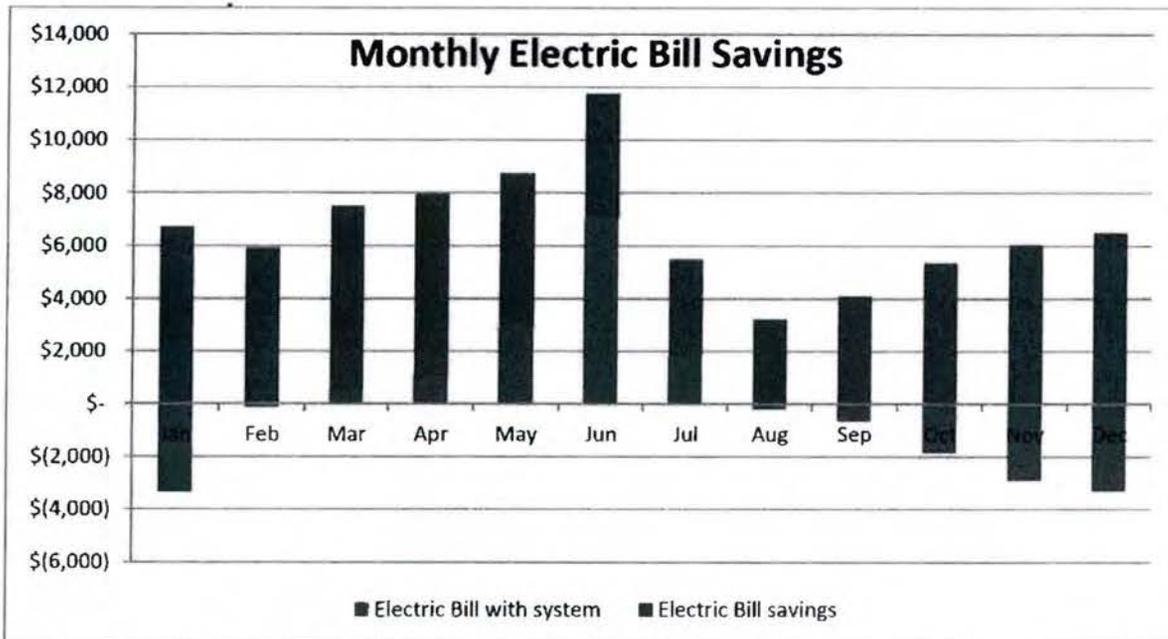
Wind:

Graph 5



Kilowatt hours produced by wind in relation to the electrical load of the parks.

Graph 6



Electric cost offset by wind electric energy production.

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Table 3

Wind Solar Specialists
Worldwide Renewable Energy Services

Month	Total Generation	Old Load	New Load	Bill Savings	Old Bill	New Bill
Jan	67925	40278	-27647	\$ 6,730.74	\$ 3,397.56	\$ (3,333.18)
Feb	59932	52841	-7091	\$ 5,938.71	\$ 5,808.95	\$ (129.76)
Mar	70756	80757	10001	\$ 7,011.25	\$ 7,520.92	\$ 509.67
Apr	69712	82646	12934	\$ 6,907.87	\$ 7,951.97	\$ 1,044.10
May	58910	82633	23723	\$ 5,837.43	\$ 8,754.91	\$ 2,917.48
Jun	47787	52296	4509	\$ 4,735.30	\$ 11,770.16	\$ 7,034.86
Jul	37000	54633	17633	\$ 3,666.37	\$ 5,512.02	\$ 1,845.65
Aug	32767	34403	1636	\$ 3,246.87	\$ 3,053.48	\$ (193.39)
Sep	41576	49582	8006	\$ 4,119.85	\$ 3,473.57	\$ (646.28)
Oct	54302	56505	2203	\$ 5,380.86	\$ 3,522.94	\$ (1,857.92)
Nov	61218	48124	-13094	\$ 6,066.14	\$ 3,160.86	\$ (2,905.28)
Dec	65753	42749	-23004	\$ 6,515.55	\$ 3,201.59	\$ (3,313.96)
Total	667638	677447	9809	\$ 66,156.94	\$ 67,128.93	\$ 971.99

Wind Resource data

The wind resource is estimated using data from New Roots Energy and 3Tier using your address. The estimated annual wind speed is 6.1m/s or 13.6mph at the tower height of 36.5meters or 120 feet. When combined with the proposed 50kW Endurance wind turbine this system will produce 166.909kWh per year per turbine. The entire wind portion of the system will cover 99% of your annual electricity needs.

Recommendation:

Solar electric energy production is the best renewable energy resource for Woodbury County Conservation's five parks. Overall, the solar resource is higher than the wind resource in the targeted area. Also, the solar electric production most closely follows the electrical load of the five parks. Net metering laws are applicable at parks where MidAmerican Energy is the electric utility service provider. Net metering is applicable from Woodbury County Rural Electric Cooperative, but the net metering incentive sunsets after 5 years. When net metering is no longer available, the electrical production will need to closely follow the electrical load. Further discussion of the net metering will follow in the Grants and Incentives Section.

2. Project Siting

Due to the findings from Section 1 (Renewable Resource) the projects will be sited using solar electric arrays. A scenario will be offered for a wind turbine to be installed in the Southwood Conservation Area. The wind resource in Southwood is considerably better than the wind resource in the other 4 parks. The wind turbine will offer a distinguishable landmark from the adjoining roadways. Southwood Conservation Area is a beautiful park quietly nestled in a valley off a gravel road. The wind turbine would allow for the park to be more readily noticed from the surrounding landscape.

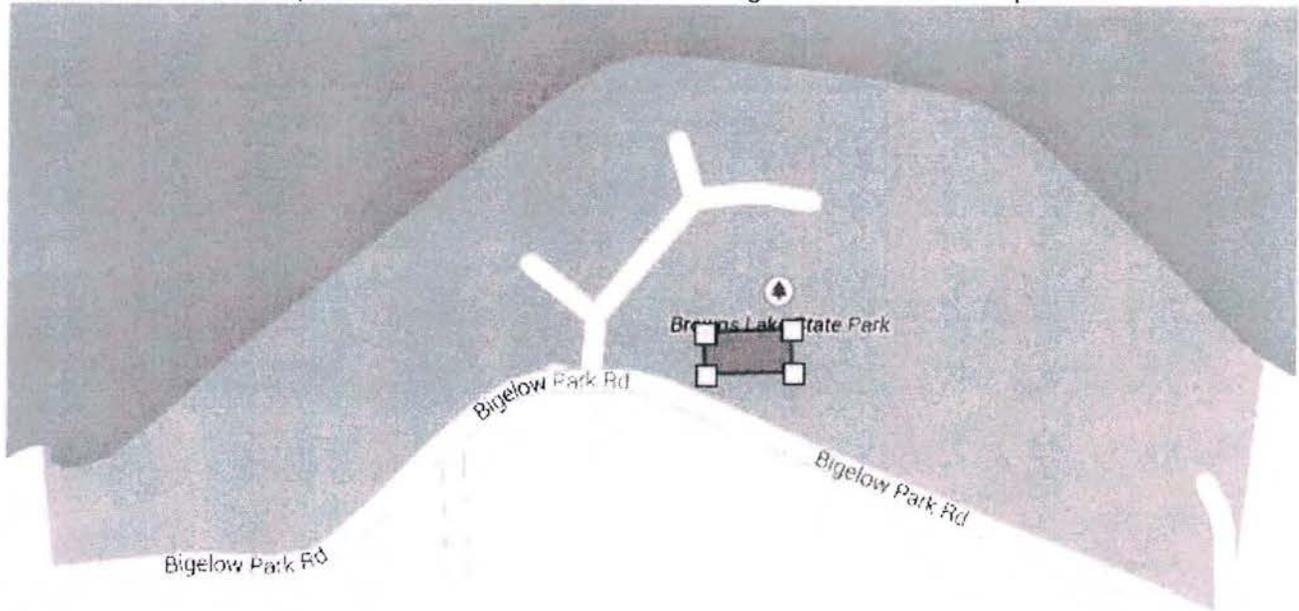
The proposed solar arrays are all ground mount solar meaning the hardware is all accessible from the ground and does not require expensive structural engineering to determine the suitability of any existing structures' roof.

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Brown's Lake Park

Brown's Lake Park solar array is sited close to the road for showcasing as well as excellent exposure.



Brown's Lake Project Siting



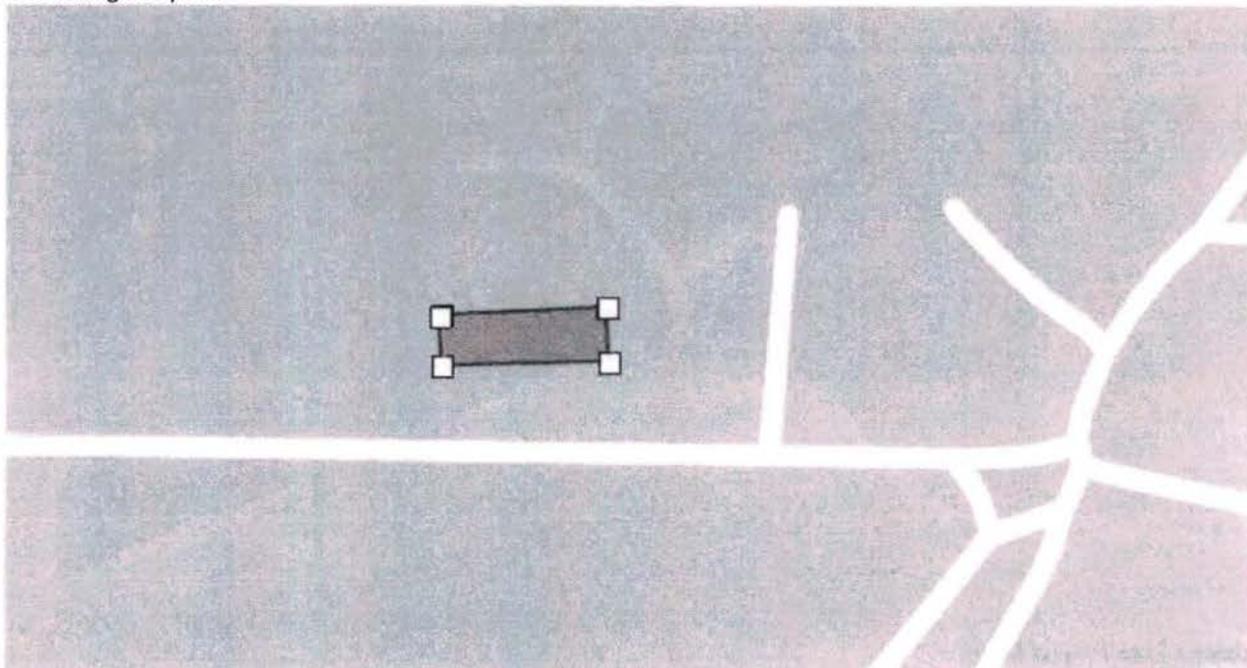
Brown's Lake Project Siting – Satellite Image

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Little Sioux River Park

Little Sioux River Park was sited in an area that had excellent southern exposure along with a strong visual presence when entering the park.



Little Sioux River Park Project Siting



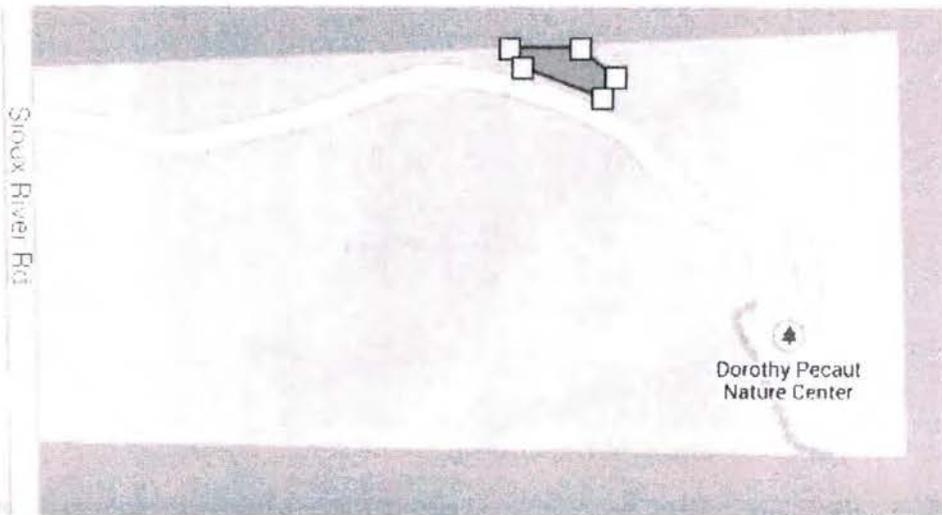
Little Sioux River Park Project Siting Satellite Image

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Dorothy Pecaut Nature Center

The electric consumption at the Dorothy Pecaut Nature Center is the largest of all of the parks. In order to install a large solar array along with have unimpeded solar access, the solar array is proposed to be installed along the roadway up to the Nature Center. The location happens to coincide with the solar array having excellent exposure to the park patrons.



Dorothy Pecaut Nature Center Project Siting



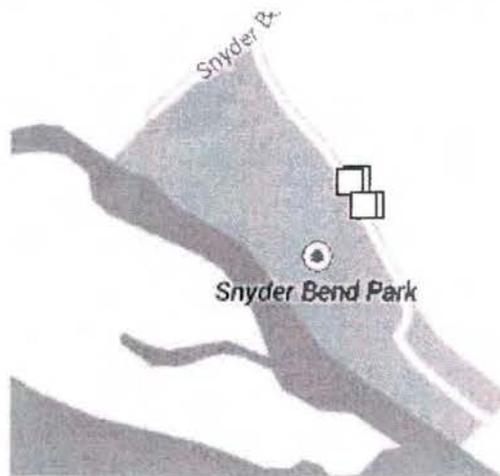
Dorothy Pecaut Nature Center Project Siting – Satellite Image

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Snyder Bend Park

The solar array is to be sited on the east side of the service road in the ditch. This area had the greatest solar exposure while having the greatest exposure to the park patrons. It also had the closest proximity to several of the utility meters.



Snyder Bend Project Siting



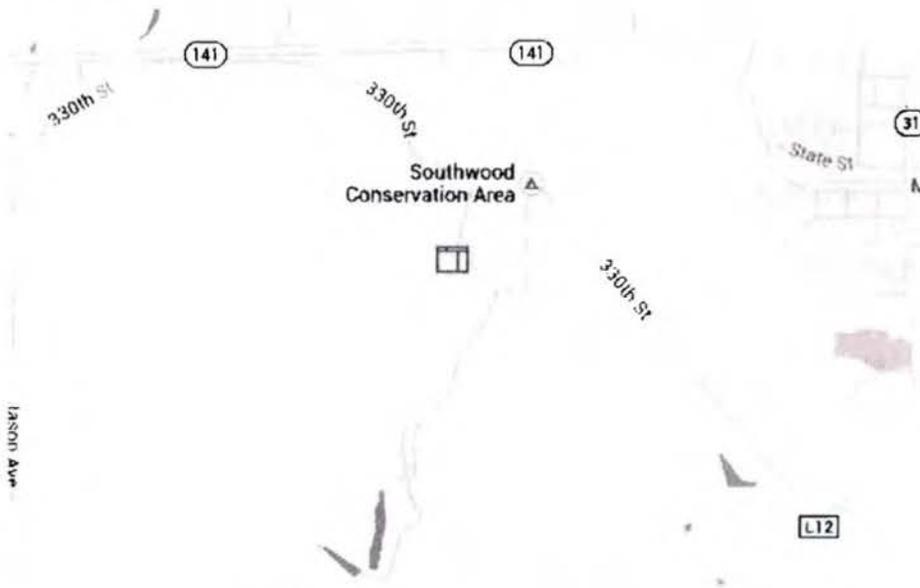
Snyder Bend Project Siting

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Southwood Conservation Area

The project is sited up on the ridge south of the residence and maintenance shed. This site has excellent southern exposure as well as great visibility to all park patrons. For this park, a wind turbine would be ideally located near the east entrance on a high knob.



Southwood Conservation Area Project Siting



Southwood Conservation Area Project Siting – Satellite Image

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3. Environmental

Working with the director for Woodbury Conservation when siting the projects, the solar arrays were placed in areas that had negligible environmental impact. A detailed flood plain analysis was not performed to assess the siting with a flood plain. Working with the director, the sites were identified, from his experience, outside of any flood zones.

Summary – No negligible environmental issues were found when siting of the solar arrays.

4. Utility Interconnection

The parks are listed below with the electric utility service provided adjacent.

Brown's Lake Park in Salix, Iowa.	Woodbury County REC
Little Sioux Park in Correctionville, Iowa.	MidAmerican Energy
Dorothy Pecaut Nature Center in Sioux City, Iowa.	MidAmerican Energy
Snyder Bend Park in Salix, Iowa.	Woodbury County REC
Southwood Conservation Area in Smithland, Iowa.	Woodbury County REC

Wind and Solar Specialists has experience in interconnecting solar electric projects on both Woodbury County REC as well as MidAmerican Energy. Both electric utilities are receptive to the interconnection of solar arrays on their systems.

The interconnection agreements for both MidAmerican Energy and Woodbury County REC were reviewed for any potential impacts to the financial viability and or economic constraints. Both utilities support net metering. Net metering is an important mechanism for making renewable energy (variable resource) projects work. Net metering is defined as following:

net metering

noun

A system in which solar panels or other renewable energy generators are connected to a public-utility power grid and surplus power is transferred onto the grid, allowing customers to offset the cost of power drawn from the utility.

Woodbury County REC offers Net Metering for 5 years and then moves to a spot market offset. This change in the net metering offering will have an impact in year 6 of the interconnection agreement. Woodbury County REC also has the discretion to change the agreement as they see fit but the agreement is in place for 3 years and has the ability to auto-renew at their discretion. Woodbury County REC's governing body is their membership.

MidAmerican's governing body is the Iowa Public Utility Commission (IPUC). MidAmerican's net metering is set and held in place by the IPUC. The agreement cannot be altered at their discretion. Once the projects are put on line under the net metering, they will continue under net metering unless changed by the state legislature.

Summary – No significant constraints are present from the utility interconnection. The five year net metering availability from Woodbury County REC is only a concern when it comes to the financing.

5. Permitting

From the research done and from past projects in Woodbury County, the only permitting required for the construction of the solar arrays is a building permit. The permit can be easily secured.

Summary – No permitting constraints.

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6. Zoning

Woodbury County does not have zoning restricting the development of solar electric projects. Setback requirements from property lines are the only zoning requirement for these projects.

Summary – No zoning constraints.

7. Economic Constraints

After performing a site assessment and walk around of the five surveyed parks, wire runs, electrical interconnections, racking requirements due to terrain variability, the project cost increased by almost \$500,000 from the initial estimate presented at October's board meeting.

October's estimate	\$1,359,000
Updated estimate after review and site survey	\$1,914,372

One reason for the change in the cost is due to the financing structures available to government entities. When consulting with different entities that finance these projects, the entities were not interested in solar electric projects with moving parts or more specifically – solar trackers. Using a fixed mount solar array requires almost ^{40%} percent more solar panels to offset the same amount of electricity.

	Installed kW	Cost per watt	Total project cost
Brown's Lake Park in Salix, Iowa.	86.6	4.75 \$	306,684
Little Sioux Park in Correctionville, Iowa.	188	2.49 \$	467,708
Dorothy Pecaut Nature Center in Sioux City, Iowa.	147	2.74 \$	402,071
Snyder Bend Park in Salix, Iowa.	147.9	3.40 \$	487,824
Southwood Conseration Area in Smithland, Iowa.	65.7	4.75 \$	250,085
	635.2	4.07 \$	1,914,372

Zipcode	State	Size (kW DC)	Cost	Date Installed	Latitude	Longitude
52317	IA	8.5	28000	3.29	8/31/2014	41.76145 -91.6023
52404	IA	10	40000	4.00	8/21/2014	41.94066 -91.6173
52353	IA	18.75	61000	3.25	8/5/2014	41.23617 -91.6932
52404	IA	4		0.00	8/4/2014	41.91784 -91.6554
52353	IA	16.25	53000	3.26	8/3/2014	41.22873 -91.6805
52247	IA	800	2200000	2.75	7/31/2014	41.55527 -91.7371
52305	IA	6.5	24700	3.80	3/17/2014	42.05013 -91.3019
52353	IA	12		0.00	3/1/2014	41.30827 -91.715
52501	IA	15		0.00	3/1/2014	41.05438 -92.4209

Iowa stagewide average cost per watt installed in 2014

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Woodbury County Conservation is a government entity and therefore ineligible for the majority of the standard tax incentives. The project incentives for a government entity for a solar electric project like this is limited to the electric utility bills paying down the debt on the project. The lowest cost of money through bonding is the greatest incentive for government entities. The Iowa DNR does have a REAP grant available but preliminarily, without going through further investigation, the size of the award would not have a significant reduction in the cost of the overall economics.

The economics broken down – no incentives apply.

Electric cost based on 2014 electric cumulative total	\$ 67,128
Cost of solar electric project	\$1,914,372
Number of years to pay for project w/o cost of money or utility rate increase (Theoretically they negate each other)	28.5

Through standard government entity financing structures, the solar electric project does not make economic sense. However, in 2014 the Iowa Supreme Court ruled that government entities can enter into third party power purchasing agreements (3PPAs). This structure allows for a for profit entity to enter into a purchase agreement with a government entity in return the government entity enjoys a reduced cost of energy without incurring the debt for the solar electric project.

Summary – Are there economic constraints that impede the development of this project? Yes and No.

If the Woodbury County Conservation Board decides to use standard project financing, WASS does not recommend further exploration of the solar electric project. If the WCCB is interested in alternate financing models, the financing models are covered in the next section.

8. Financing Models

Two common alternative financing models exist for projects of this nature and are currently in practice in Iowa. The first model is the Minnesota Flip Structure (Flip) and the Third Party Power Purchase Agreement (3PPA). The Flip and the 3PPA requires that an equity investor owns all or part of the solar electric project and then sells the project back or the electricity back to WCC through its standard electric bill payments. WCC can enjoy the benefits of a solar electric project without raising funds or letting bonds.

The Pros and Cons of Each Structure

Description	Minnesota Flip	3PPA (Lease)
Risk	WCC still owns a portion of the project until incentives are full exhausted (typically 10 years.)	WCC owns no portion of the project.
Electric bills	Typically remains the same during the buyback period.	Typically costs 10% less than what WCC currently pays but has an annual inflationary rate.
Inflationary rate	Drops off when project is paid for and electric bill would typically drop to zero.	Increases annually each year of the PPA agreement.
Agreement term	10 years (typical)	25 years (typical)
Insurance	Typically not included	Included in the electric rate
Maintenance	Typically not included	Included in the electric rate
Electricity load increase	Does not scale unless new agreement established	Typically scales at the rate of the rest of the project rate.
Interconnection Agreement	Passes through to WCC	PPA supplier mitigates the changes

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