

SHINING LIGHT ON SOLAR ENERGY PROSPECTS IN IOWA: DECORAH & THE PATH TO IOWA'S ENERGY FUTURE



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Abstract

The sun is our most impressive source of energy. More than one million times the earth's size, every year the sun provides ten times more energy than is stored in all the world's reserves of coal and oil. The amount and intensity of sunlight varies by location, climate conditions, as well as daily and seasonal trends. Although southern states such as Arizona, California, and New Mexico receive the most sunlight during the year, Iowa ranks among the top third in the United States in the technical potential for solar energy production. Iowa's 16th-place ranking puts it ahead of many states to the south including Florida, Georgia, and South Carolina. Iowa's rooftop solar energy potential alone could meet close to 20% of Iowa's annual electric needs under optimal conditions. The decentralized approach to electricity generation through the creation of small-scale and distributed energy facilities has done wonders for solar proliferation in the state of Iowa as well as had a positive impact on the state's economic development. Solar energy in Iowa now powers farms, businesses, universities, utilities, communities, and industries, as well as vehicles, and homes in the state. The purpose of this study is to analyze Iowa's current solar energy blueprint by focusing on current practices, financial aspects, recent policy, and potential limitations. At the heart of this study is the examination of the northeast Iowa community of Decorah where renewable practices are epitomized with more than 50 solar projects found in a town of only 8,000 people. This study will correlate current policy and financial considerations to the case study of Decorah in order to help build a model for solar proliferation in the state of Iowa. It will show that although there may not be a perfect model for solar proliferation for each community in Iowa, there are many recommendations to help the process, including reauthorizing the state solar energy tax credit, cities creating community gardens, and electric

utilities' re-framing of the term "distributed generation" for becoming a comprehensible term which would boost understanding and awareness for potential ratepayers.

Why Renewable Energy

Rising global temperatures, wildfires, drought and increased energy demand put stress on the nation's energy infrastructure. Severe weather is the leading cause of power outages and fuel disruption in the United States. Eight of the ten most destructive hurricanes of all time have occurred in the last ten years and such severe weather is expected to continue. In an effort to relieve the stress on the country's energy infrastructure, research and development of renewable energy technologies is a significant component of the President Obama's Climate Action Plan. Increased use of green energy technologies is expected to reduce the nation's contribution to global warming and provide for alternative sources of grid reliability during extreme weather conditions. Access to reliable energy correlates to economic security and stability in developing countries as these new energy sources produce minimal carbon emissions and contribute to poverty reduction by providing improved energy access in underserved areas.

The environmental aspects of renewable energy generation are appealing to a large percentage of the population According to a 2013 poll: Americans want more emphasis on renewable energy generation, specifically: solar power (76%), wind (71%), and natural gas (65%) (Jacobe). This interest is not isolated to the United States, there are programs all over the world in place to generate renewable energy as well as incentives for participation and research & development. Renewable energy is likely to stay here in the United States and across the world.

As a national leader in wind energy production, Iowa demonstrates a favorable market for green and renewable energy resources. According to the Iowa Economic Development

Authority, Iowa ranks second in wind energy generation in the United States. Solar energy has the potential to complement wind energy and contribute to grid stability and an overall reduction of stress on the electric power grid as solar energy availability is highest during the summer, while wind is highest during the winter. As installation and technology costs for solar energy has steadily decreased, the combination of wind and solar energy production can help Iowa to achieve much greater overall levels of renewable energy. In 2013, wind provided 27% of Iowa's total electricity generation. Iowa is also the largest producer of ethanol in the United States, accounting for 26% of the nation's fuel ethanol production in 2011. Finally, Iowa ranked third among states in 2013 for electricity generated from non-hydroelectric renewable energy resources (US Department of Energy, 2014).

Varied Interests

There are a multitude of stakeholders when it comes to solar energy generation. There are the energy users and consumers who may be motivated by concern for the environment or desire to be off the grid. There are electric utility providers who have an obligation to meet the needs of all electricity users by providing a safe, reliable and affordable form of electricity. Between the consumers and the utilities are many business developers, planners and providers who stand to benefit if the market moves towards renewable resources and those from the non-renewable side who stand to lose as the market changes. The opposition to renewable resource development is driven by traditional energy producers, which use their resources to maintain the status quo.

Solar Energy in Iowa

According to a report by the Iowa Environmental Council, Iowa has the potential to be a leader in solar photovoltaic (PV) production. Across Iowa there are examples of solar panels powering farms, businesses, universities, utilities, communities, vehicles and homes. The

potential to expand on these successes exists across the state. When considering Iowa’s solar potential there are a multitude of factors: not only does an abundant amount of solar energy reach the state, Iowa has abundant land areas and buildings that are suitable for solar projects set-up (Baer & Hauge, 2013).

Figure I:

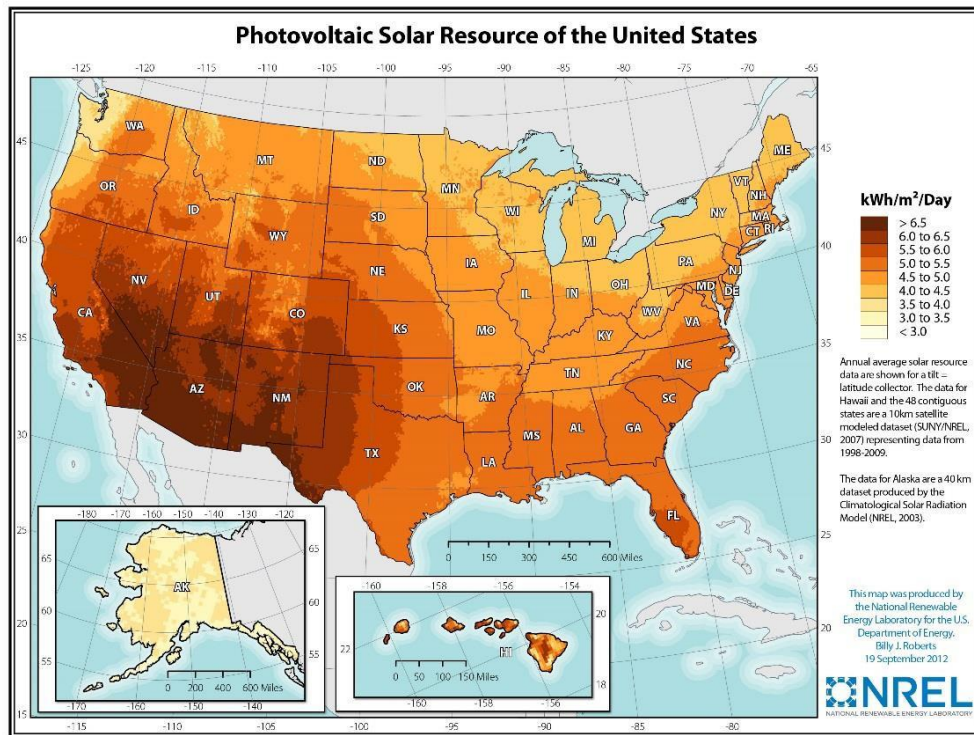


Figure I. An illustration of solar energy resources that reach each state in the U.S. (National Renewable Energy Laboratory)

Financial Incentives for Iowans to Participate in Renewable Energy

Iowans and Iowa businesses have a variety of financial benefits when considering renewable energy including:

- The Alternate Energy Loan Program (AERLP) provides loans to any individual or organization who wants to build renewable energy production facilities in Iowa.

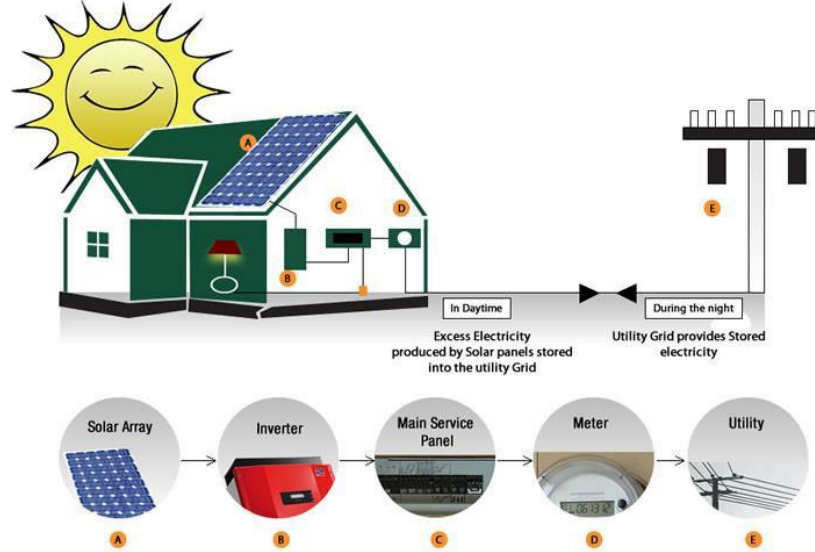
Successful applicants receive a single, low-interest loan that consists of a combination of AERLP funds and lender-provided funds

- Iowa Utility Rebate Program - A Rural Electric Cooperatives energy efficiency rebate program offered by the Central Iowa Power Cooperative (CIPCO). CIPCO is a generation and transmission cooperative serving 12 rural electric cooperatives (REC) and one municipal electric cooperative in the state of Iowa.
- The Iowa Department of Revenue has a solar energy tax credit for systems installed on property located in Iowa. Eligible systems must be in service on or after January 1, 2012, but before January 1, 2017. Credits awarded are on a first-come, first-serve basis.
- The IADG Energy Bank Revolving Loan Fund provides low-cost financing to energy efficiency and renewable energy projects for Iowa businesses and industry.
- Energy Star provides a Federal Tax Credits for Consumer Energy Efficiency page on their website for 2012 and 2013 tax credit information.

How Solar Energy Works

Converting photovoltaic (PV) energy, otherwise known as “Solar Power,” into an energy source is fairly a straightforward and simple process to understand. In order to harness the solar PV energy that the sun produces one must have a “Solar Array” of polycrystalline PV energy cells connected into a solar module. Essentially, the mechanism that captures this energy is a solar panel that is attached on an outside structure that has direct sight to photons. When sunlight shines onto the solar panel array, the sunlight is converted into electrons of direct current (DC) electricity by the solar panels. From there, electrons flow out of the solar panel and into an inverter and other electrical safety devices which prevents surging or overloading of the power generating system. The generated DC power is then converted into an alternating current (AC) by the inverter which is used to power lights, HVAC systems, and other household electronics/appliances. Figure II provides a brief description of how a PV power system works and what are the functions of its components.

Figure II - How Solar Energy Works

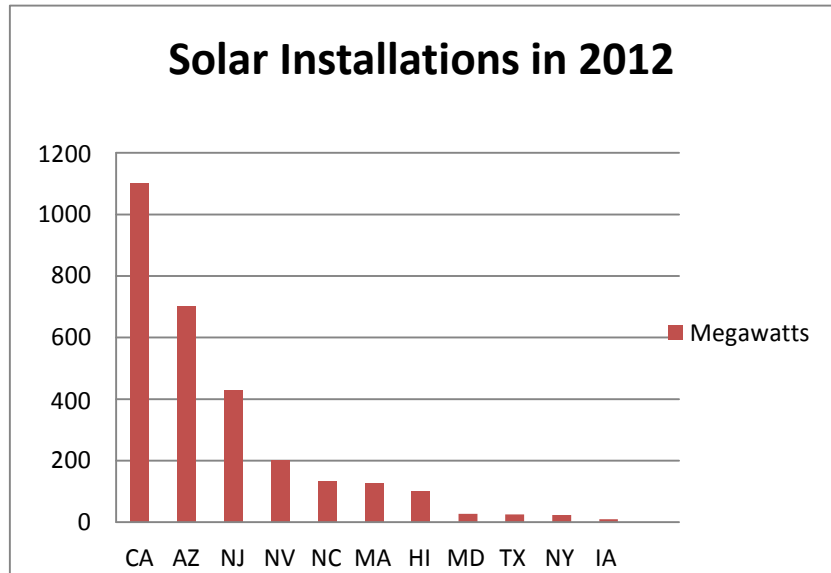


(ClarySolar Corporation, 2014)

Financial Aspects

There are other financial incentives in place in having a solar PV system besides reducing an individual electric bill. One of the biggest hurdles which ratepayers encounter is the large capital expense of installing a solar PV system for their residence. However, several factors have resulted in the cost reduction of installing & maintaining a solar PV system. In the United States, costs for photovoltaic panels have dropped more than 80% in the last five years, setting the solar industry up for a potential business boom and poising the industry to eventually surpass the wind energy generation industry. Currently, there are around half a million solar rooftops in the U.S., but more solar panels were installed in the past 18 months than in the previous 30 years (Solar Energy Industries Association, 2013). Figure III below shows the concentration of solar installations across the United States in 2012.

Figure III:

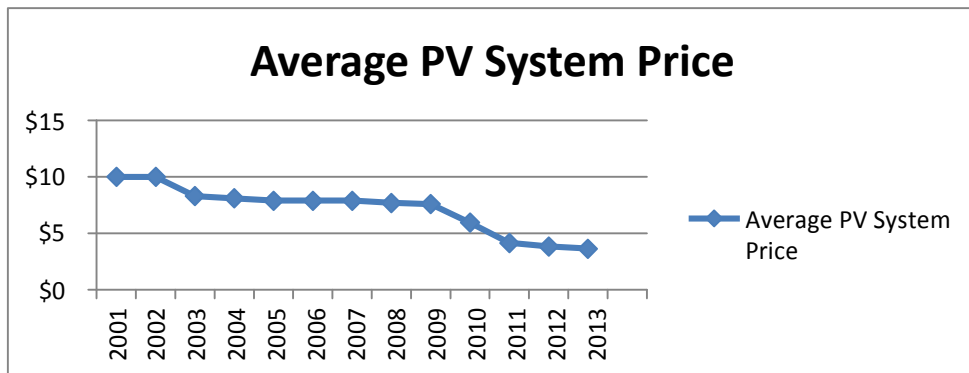


(Iowa Environmental Council, 2014)

Figure IV listed below shows the steady decline in Solar PV System cost with the gradual increase of solar panel production. For example, in 2001, the cost of installing a Solar PV System to produce 1 Watt of power cost \$10. In 2013, the cost of producing 1 Watt of power just fell under \$4 (Iowa Environmental Council, 2014). Although with steady price drops in Solar PV systems at the present time, costs have plateaued and appear to be holding for the foreseeable future (Mandelbaum, personal communication 2014).

Figure IV:

Figure IV – Solar PV System Cost per Watt



(Iowa Environmental Council, 2014)

Several factors have resulted in these system cost reductions which include:

- The cost of manufacturing solar PV system components have been dropping due to technological advancements in manufacturing.
- The number of consumers utilizing solar PV systems has increased sharply over the past five years.
- The numbers of solar PV system installers/technicians who are skilled in installing these systems have increased which has reduced the cost of labor in installing/maintaining these systems.

Even with the price declines over the years in the installation cost of solar PV systems, the initial cost for the average consumer can be cost-prohibitive. For example, the average cost of a 3.0 kilowatt system for a small home would cost \$14,500 to a 9.0 Kilowatt system for a large family home costing almost \$33,000 (Dovetail Solar Corporation, 2014).

Iowa Solar Energy Industry

Currently Iowa's net solar energy generation does not account for a measurable percentage of the net energy generation mix (U.S. Energy Information Administration). With continued current policies, it is reasonable to expect solar energy to account for 1-2% of Iowa's net energy generation mix in about 10-15 years. The steady growth of this industry threatens to transform utility markets as they are known today. There are many components that utilities have to consider as renewables weigh with increased weight on the leverage scale:

- How to ensure stability and reliability while incorporating resources that can be weather dependent and unpredictable?
- How to ensure level rates to all customers regardless of their participation or ability to participate in renewable energy production?
- How to develop paths for all customers to participate in renewable energy generation?

Net Metering

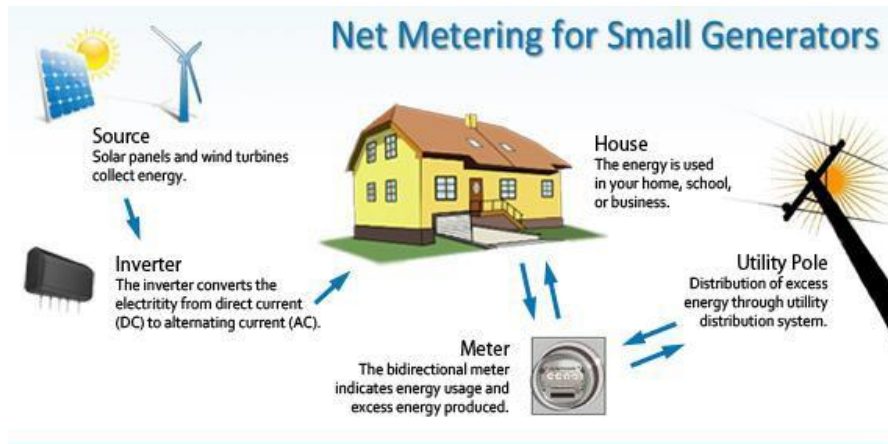
Depending on location, there are several ways for Iowa residents and/or business owners to participate in generating and using solar energy. Consumers who live in areas serviced by Investor Owned Utilities (IOUs), they may install their own solar system and complete a net-metering agreement.

Iowa's net-metering rules took effect in 1984, and are available to all customers of investor owned utilities. Across the United States, 43 states and Washington, D.C. have net metering policies (Durkay, 2014). Net metering is a form of billing which credits those who connect their solar energy system to the grid. A property with a solar system has its meter credited for energy it feeds into the grid, offsetting usage during periods without production, such as the evening. MidAmerican Energy, Iowa's largest utility, rates eligible facilities in Iowa up to 500 kW (MidAmerican, 2014). The company describes the process as:

Energy delivered to MidAmerican Energy at the metering location is subtracted from the energy consumed (kilowatt-hour consumed minus kilowatt-hour delivered). If a customer consumes more energy than it delivers, the resulting net kilowatt-hour is billed to the customer at the same electric rate at which the customer normally purchases its energy from MidAmerican Energy. If the customer delivers excess energy to MidAmerican Energy's electric distribution system during the billing period, net metering provides the customer energy credits that can be stored in the customer's account for future use in subsequent billing periods.

As shown in Figure V, net metering allows utility customers to self-produce clean energy able to meet a good portion of their own energy needs. When these consumers utilize their solar PV systems, customers who generate electricity would avoid paying for the utility's electrical power, which is fair because these consumers are not using power from the power grid (Iowa Environmental Council, 2014). However, it is argued net metering consumers also avoid paying for all of the fixed costs associated with ongoing maintenance, expansion, and repairs to the power grid that delivers power when they need to use electricity and also uses the same system that takes the power they sell back to the utility. As a result, these grid costs are shifted to those customers without solar PV systems through higher utility bills. (Power by Association, 2013).

Figure V:



(Michigan Public Service Commission, 2014).

On average with net-metering, only 20-40% of a solar energy system’s output ever goes into the grid (Solar Energy Industries Association, 2014). While the number of solar net metering projects remains small in the state, there are efforts by utilities both in-state and nationally to address what they perceive as fairness issues. MidAmerican President and CEO Bill Fehrman told the *Des Moines Business Record* that “as people talk more and more about wanting to do (rooftop solar), more and more will get paid for net metering,” he said. “That becomes a very significant fairness argument, because of the average 10.5 cents a customer pays per kilowatt-hour, 6.3 cents goes to generation costs and 4.2 cents goes to transmission and distribution costs. If you’re a solar owner, you actually get paid for - and the utility doesn’t get - the price for the generation and the price for the grid. Yet we still have to maintain the grid and we still have to maintain the generation for those times when you have to use the grid” (Gardysz, 2014).

While net metered solar transmission does come with a cost to the utilities, there are fears that reduced reimbursement rates could discourage and stifle new rooftop solar production. The national Solar Energy Industries Association states that “some utilities perceive net metering policies as lost revenue opportunities” though these policies “create a smoother demand curve for electricity and allow utilities to better manage their peak electricity loads” (Solar Energy Industries Association, 2014). The Environmental Law & Policy Center, a national organization with an office located in Des Moines, Iowa, represents environmental groups and solar developers in legal cases concerning energy policy. The

center's staff attorney, Josh Mandelbaum, said, "from the installers we hear a lot in terms of net metering. And they wish net metering was the same across the state." Most of the rural electric cooperatives and municipal utilities do not have net metering, and of those that do, it is different than the traditional model. Beyond standardization of these policies across utilities, "There is a lot of interest if the economics is there." said Mandelbaum (J. Mandelbaum, personal communication, October 20, 2014).

Net metering isn't always an option for residents who receive their electricity via a municipality (Muni) or Rural Electric Cooperative (REC), however there are community solar projects that are available where a participant may make an upfront investment for a portion of the capacity of a solar array and then receive a credit on their utility bill based on the how much electricity their share produced. A well-known Iowa example is the success of the Farmer's Electric Cooperative solar farm near Kalona. In the summer of 2014, the farm added 2,900 solar panels to the project, generating up to 1.1 million kilowatt hours a year, enough energy to power 120 homes (Eller, 2014). When the group initially started looking at solar in 2008, there was a goal to get 15% of its energy from renewable sources by 2025; the group is expected to surpass that goal by the end of 2015 (Eller, 2014).

In Iowa, there are boundary maps and a resident's electricity service provider is determined by where they live. Nearly 75% of residents receive electricity from Investor Owned Utilities (IOUs), such as Alliant and MidAmerican. Just over 11% of resident's contract with municipalities (Muni), meaning the city or town is responsible for self-governing the electrical utility services. The remaining 14% of residents in the state receive electricity from Rural Electric Cooperatives (RECs). RECs are non-profit co-ops usually governed by members. The Iowa Utilities Board (IUB) has regulatory authority over IOU rates and other service issues. IUB authority is mostly limited to service, safety, and engineering issues for the Muni and REC utilities in Iowa. The IUB has very limited authority for non-utility generators.

Figure VI

Iowa Utility Electric Profile (2013)					
Utility Type	# of Utilities	# of Customers	% Customers	MWh Sales	% Sales
IOU	2	1,135,902	72.22%	34,804,143	74.49%
Muni	136	211,407	13.44%	5,346,595	11.44%
REC	44	225,6624	14.34%	6,571,420	14.07%
Total	182	1,724,933	100.00%	46,722,158	100.00%

(Iowa Environmental Council, 2014)

Iowa: Recent Executive-Level Policies

Dramatic policy changes are required in order for solar energy to account for 5% of Iowa’s net energy generation mix during the next 10-15 years (Mandelbaum, 2014). Meeting 20% of Iowa’s electricity needs could be met by Iowa’s rooftop solar potential alone. Expanding Iowa’s solar PV penetration to meet just 5% of electricity needs can be accomplished with a minimal footprint if our policy-makers make it a priority.

Looking back, the Iowa Power Fund was a major initiative of Governor Chet Culver, who served from 2007 to 2011. Culver invested state resources in renewable energy innovation and aimed to decrease Iowa’s reliance on foreign energy sources. The administration’s Office of Energy Independence and the Iowa Power Fund invested in research, education, and commercialization of clean energy technology (Kasotia, 2014). In total, \$100 million of state money was allocated to the Iowa Power Fund, \$75 million of which went to investment in an array of renewable energy projects. Power Films, an Ames, Iowa-based solar film product company received \$220,000 to develop solar technology which integrates with building materials (Iowa Environmental Focus, 2011). Along with investment in commercial development, the Iowa Power Fund also granted \$1.68 million to Iowa State University to research new materials which could increase the efficiency of solar film cells (Iowa State University, 2009).

Funding for the Iowa Power Fund ended with the election of Governor Terry Branstad, who did not continue this policy priority when taking office in 2011. The Office of Energy Independence was dissolved, though certain elements of the office continued in Governor Branstad's restructured Iowa Economic Development Authority (IEDA) and other parts of government which oversaw continuing contracts related to the Power Fund. At the time the Power Fund was phased out, IEDA Director Debbie Durham said Iowa remained committed to supporting renewable energy (Lucht, 2011).

In November 2013, IEDA announced that its State Energy Office was awarded a \$1.03 million grant from the U.S. Department of Energy to promote the adoption of solar energy in Iowa. The grant was part of the Rooftop Solar Challenge II, a national initiative to make solar energy a more cost-competitive form of electricity. Using a collaborative model, IEDA would work with the Iowa Association of Municipal Utilities and the Iowa Environmental Council to form teams to advise communities on the benefits of solar PV. These teams would provide resources related to planning and zoning, promote the standardization of net metering, and identify and evaluate policy options at the local and state levels to further reduce soft costs of solar installation. In the press release announcing the funding, Governor Branstad said, "Iowa should be at the front of the pack in implementing programs that encourage the use of solar energy as well" (Iowa Economic Development, 2011).

However, within a few months the Iowa Economic Development Authority had returned the grant following complaints from Iowa's major utility companies about the use of grant funds to evaluate solar policies. Industry representatives also insisted any reference to the benefits of solar power include a list of its downsides (Henderson, 2014). Emails acquired by the *Associated Press* found the president of the Iowa Utility Association, which represents MidAmerican Energy and Alliant Energy, wrote to IEDA's general counsel that "to be completely responsible to potential solar customers, the (proposal) should also reference the 'limitations' of solar whenever it speaks of the benefits." Soon after, state officials made amendments to the proposal, which were found unacceptable by U.S. Department of Energy. While negotiations between the federal department and state continued for some time, the grant was eventually returned. An official of the department, Joshua Huneycutt, responded to the changes in an email to IEDA

saying, “Many of the edits I’ve encountered seem to suggest a significant scaling back of the ambition of the award and a generally adverse/suspicious viewpoint towards solar, which is not acceptable in the context of an award made explicitly to promote solar energy adoption” (Foley, 2014). The rejection of this grant points to the influence of the large utilities in forming state energy policy. While this episode may slow Iowa’s move to “the front of the pack” in solar implementation, as Governor Branstad called for, he soon signed popularly passed legislation to increase solar tax credits in the state.

Recent Legislation

One of the most important state policies supporting solar energy development is the Solar Energy Systems Tax Credit. Passed in 2012, this legislation allows businesses, farms, and ordinary citizens alike to claim a credit equivalent to 50% of the federal solar tax credit for installing PV panels (Senate File 2342, 2012). Those who pay commercial or residential taxes in the state are eligible for the credit. The combination of the state and federal credits can help defer up to half the upfront costs of a solar energy installation (Baer, 2012). Annually, \$1.5 million was made available for this program which is administered by the Iowa Department of Revenue. By March 2014, 622 projects utilized more than \$2.8 million in credits for projects which have invested \$24 million in solar energy development (Associated Press, 2014). Since the enactment of the credit, interest has been high and applications for credits have exceeded available funds. Applications with a combined credit value over \$750,000 were wait-listed in 2013 after the credit pool had been exhausted (Uhlenhuth, May 2014).

The taxpayer may also claim a credit of 18% of the qualified expenditures of the solar PV System. Those qualified expenditures include: Solar PV system material costs, labor costs for on-site preparation, assembly or original system installation, and for piping or wiring to interconnect a system to the home. The installation of solar energy equipment is also exempt from State of Iowa sales tax. The market value added to a property by a solar energy system is exempt from the state of Iowa property tax for 5 full assessment years as well.

During the 2014 legislative session, lawmakers voted to triple the amount of the solar tax credit from \$1.5 million to \$4.5 million annually. The Iowa Senate approved the bill unanimously and it only

faced four dissenting votes in the Iowa House. The credit cap for individuals was raised from \$3,000 to \$5,000 while the credit cap for businesses climbed from \$15,000 to \$20,000 (Conor, 2014). The law also increased the allowable claim amount on the federal solar tax credit, which expire at the end of 2016, from 50% to 60% of the amount.

Additionally, the legislation included a provision allowing businesses with multiple locations to an individual credit for each location (Uhlenhuth, May 2014). With increased funding and eligibility options, more businesses may see economic benefits from installing solar PV. Following the passage of the tax credit increase, the energy efficiency project manager at Cedar Rapids-based distributing company Van Meter Inc. told *The Gazette*, “A lot of people have been looking at solar energy systems and now, with the state tax credits, they’re starting to move forward” (Lynch, 2014).

State Senator Rob Hogg of Cedar Rapids, a state leader in renewable energy policy and the sponsor of the 2014 solar tax credit legislation, was asked what solar policy proposals he expected to be discussed during the 2015 legislative session:

I do not expect any solar legislation in 2015. I believe the 2014 expanded solar tax credits need to be given time to work. That does not mean that advocates should be silent about solar. Rather, advocates should continue to educate legislators of both parties about the benefits of solar power. (Hogg, 2014)

While new state legislative policy is not on Senator Hogg’s mind in the near-term, he suggested that national policy will also impact solar energy development in the state. “It is important that Iowans act now to install solar because federal tax credits are scheduled to expire at the end of 2016,” he said. “Advocates should begin working now to show Congress that the credits work and should be extended.”

Federal Policies

The U.S. Federal Tax Credit which was established by *The Energy Policy Act of 2005* and was further extended to December 31, 2016 by *The American Recovery and Reinvestment Act of 2009* which establishes the tax credit a consumer can utilize on solar PV systems (DSIRE Solar, 2014). The highlights of the Federal Solar Tax Credit include:

- The taxpayer may claim a credit of 30% of the qualified expenditures of the solar PV system. Those qualified expenditures include: solar PV system material costs, labor costs for on-site preparation, assembly or original system installation, and for piping or wiring to interconnect a system to the home.
- There is no credit limit cap for solar PV system under the Federal Solar Tax Credit
- If the federal tax credit exceeds tax liability, the excess amount may be carried forward to the succeeding taxable year. However the excess solar tax credit can only be carried forward until December 31st, 2016 at the present time.

Eagle Point Decision

An interesting development in the solar energy industry in Iowa was a ruling by the Iowa Supreme Court in favor of Eagle Point Solar to own, install, operate, and maintain an on-site PV generation system at a city-owned building under a power purchase agreement (PPA), with the City of Dubuque.

The July 2014 Iowa Supreme Court decision ruled that solar developer Eagle Point Solar, did not act as a public utility by entering into a third-party purchase agreement (PPA) with the City of Dubuque. This ruling figures to be an important decision with lasting ramifications for the solar industry in Iowa and beyond. In 2011, Eagle Point Solar installed a 175-kilowatt system on top of the Dubuque city building. Alliant Energy appealed to Dubuque's city council, then to the Iowa Utilities Board, claiming that the project would infringe on its legal monopoly to provide service in the area (Uhlenhuth July, 2014). Since Eagle Point Solar profited from the energy production of the installation, argued Alliant, it illegally acted as a public utility.

In a 4-2 decision, Justice Brent Appel wrote for the majority saying that the agreement between Eagle Point Solar and the City of Dubuque did not require additional regulations:

"There is simply nothing in the record to suggest that Eagle Point is a six-hundred-pound economic gorilla that has cornered defenseless city leaders in Dubuque."

"Indeed, the nature of the third-party (power purchase agreements) suggests the opposite, as the city has entered into what amounts to be a low-risk transaction — it owes nothing unless the contraption on its rooftop actually produces valuable electricity" (Rodgers, 2014).

The ruling could open the door to more solar projects in Iowa as individuals, businesses, and governments are given more options in how to finance installations and reduce upfront costs. The reality is that entities without any tax liability such as government buildings, non-profit institutions, some hospitals and schools cannot collect tax credits for renewable energy. Hence, such third party power purchase agreements are often crucial to making the finances of rooftop solar work. Eagle Point's president and CEO, Barry Shear, told *Midwest Energy News* following the ruling, "There's nothing not to like about this ruling unless you're a coal miner in Virginia or a utility in Iowa" (Uhlenhuth July, 2014).

The case was closely followed outside of Iowa, as there are a number of states without legislation related to power purchase agreements. Iowa's court ruling could lead to other states defining these relationships through the judiciary. In neighboring Wisconsin, utility *We Energies* has proposed barring its customers from leasing solar panels and seeks to impose a new surcharge on customers who generate their own power. This and other cases related to rates applied to solar transmission are heating up across the state. Carl Siegrist, a solar energy consultant in Milwaukee, told the *Milwaukee Journal Sentinel*, "This (Iowa) decision is a victory for customer choice and represents a common sense policy that should be available everywhere." He continued, "The old investor-owned utility monopoly model needs re-examination. The public supports more renewable energy and seems neutral on who provides it. This decision is good for our clean energy future" (Content, 2014). With the Iowa Supreme Court clearing the way, the Eagle Point decision could become part of the legal arguments in Wisconsin and other states to expand solar financing options.

Case Study: Decorah

Now with a comprehensive understanding of the current state of solar energy in Iowa, it is time to look at one of the regional leaders in sustainability. Found in northeast Iowa, the town of Decorah has not only received statewide attention for their sustainability efforts, but also national attention. Even U.S. Secretary of Energy Steven Chu acknowledged, "Luther College and Decorah, Iowa, are great examples

of how our local communities can help lead the way in making sure that America wins the global clean energy race” (US Department of Energy, July 18 2014). This section will explain why and how Decorah has received such recognition and whether their processes could be matched across the state of Iowa.

Background

The city of Decorah is the county seat of Winneshiek County and has population of around 8,000 people. It is home of the annual Nordic Fest, a celebration of Norwegian culture and home to an operating trout hatchery. Remarkably, despite its relatively small population, it has gained significant local and national attention for its environmental sustainability efforts with at least 50 solar projects within the city limits. Winneshiek County, although a small rural county, already has more than 100 households and small businesses with solar PV. Young people are even attracted to town of Decorah due to this reputation for sustainability. The questions are why and how Decorah has taken this intense initiative and whether it could modeled across the state of Iowa. As will be seen, many residents, businesses, and non-profit institutions have been taking steps to make the community more sustainable. The partnership among the City of Decorah and other public, private and non-profit organizations have laid the framework for renewable proliferation across the area. Specifically, organizations such as Decorah-based GoSolar and the Winneshiek Energy District have helped customers with the paperwork necessary to utilize federal and state tax incentives which help pay for their individual solar panel system. Institutions like Luther College have instilled a mindset within young students that transcend into the Decorah community about leading society in a much more sustainable way.

Alliant

Alliant Energy over the last few years has partnered with Decorah residents trying to increase their economic potential through the supplying of electricity. Majority of residents of Decorah have been satisfied with Alliant because the power has been reliable and Alliant has offered energy efficiency programs which residents have been able to tap into (“Alliant Plans \$500,000 in Projects,” 2014). Jim Collins, Regional Alliant Energy Representative, said he spends most of his time in Decorah focusing on

energy efficiency by working with large industrial customers on ways to save energy and use it wisely. Just last year, Alliant offered more than \$400,000 in incentives to the Decorah community.

The Alliant Energy solar energy installation rebates has a deadline of December 31st 2014. Although the Alliant rebate is not likely to return anytime soon, prices keep falling on solar panels which makes the rebate less vital. Additionally, there are still significant state and federal incentives available. As Jim Collins emphasized, “We’re at a point that they’re doing it (implementing solar panels) without the Alliant energy rebate” (Alliant Plans \$500,000 in Projects,” 2014).

Tax Incentives

Even without the great statewide rebates, there are other means to reduce the cost of going solar in Decorah. Decorah homeowners and businesses have been eligible for tax credits for qualified solar panel installations with relatively timely payback timeframes and above-average rate of return. As mentioned earlier, the state of Iowa offers a personal tax credit equal to 60% of the federal solar tax credit of 30%. Both can be claimed on Decorah resident’s yearly tax returns after a solar installation has been completed on their home. In Decorah specifically, residents with solar energy equipment have piggybacked on the federal tax credit as well as the state’s tax credit. When all bundled together, homeowners in Decorah have been looking at 6-8 year paybacks, and Decorah business are seeing 4-6 year paybacks. Specifically looking back to 2008, a residential 5KW system in the City of Decorah was valued roughly around \$8,000KW, or \$40,000. Now in 2014, the average Decorah solar projects are looking just to cost over \$20,000 or \$4,000KW with the utilization of the 15% Iowa tax credit on top of the federal 30% tax credit. With electricity costs likely to continue rising in the state, most Winneshiek County households, farms, and businesses see simple payback times of near or well under 10 years, because quality panels can easily produce for well over 30 years (“Solar Solar,” 2014).

Net Metering

All Winneshiek County utility customers are eligible for net metering with surplus production credited to their utility account. As already stated, when Decorah residents utilize this net metering

incentive, customers who generate their own electricity would also avoid paying for the utility's electrical power. Net metering does not help with up-front costs for Decorah ratepayers, but it certainly makes the power they are generating more valuable over time. It may not be a perfect solution, but net metering is straightforward approach for the vast majority of utility customers within the Decorah community.

City of Decorah

To date, many populous cities across the globe have started to invest in becoming green business hubs, to fight climate change. In addition to creating new jobs, increasing the use of renewable energy offers other important economic development benefits. For one, local governments collect property and income taxes and other payments from renewable energy project owners. These revenues can help support vital public services, especially in rural communities like Decorah where projects are often difficult to fund. As local leaders in Decorah feel that there are not enough resources to invest public money in, committed and motivated people in Decorah, through academic institutions and the local businesses, transcend these limitations. This community commitment has allowed local city officials to engage public, private, and non-profit entities to pursue renewable practices (Chad Bird, personal communication, 2014).

As a result, the City of Decorah is primarily focusing on facilitating citizens' use of existing sustainable programs creating an environment for environment sustainability. The city does this through zoning and building ordinances which are solar array-friendly. According to City Manager Chad Bird, to further help the solar energy industry, the city would like to see the state and federal rebates and tax credits continue into the future. When potential solar investments come to the city, Bird believes that the city should make strong considerations towards rate of return, city expenditures, and public perception:

- Long-term return on investments
- The expenditures of city funds/ public monies on solar projects
- Public perception

Luther College

Luther College is the biggest employer in Decorah. Since its founding in 1861, the college has remained true to its goal in preparing graduates to respond to a changing world. Luther College has been recognized as one of the most sustainable schools in Iowa and the nation. Carbon neutrality has been a strategic goal of the college since June 2007 when President Richard Torgerson made Luther one of the 70 charter signatories of the American College and University President's Climate Commitment. Among recent distinctions, Luther College has earned a STARS (Sustainability Tracking, Assessment, and Rating System) silver rating, a 2013 listing as a top green college in *The Princeton Review's Guide to 322 Green Colleges* and recognition by the Sierra Club as one of the nation's greenest universities. As a regional leader in campus sustainability, Luther College makes it a responsibility of its faculty to promote ecological and wellness efforts throughout the region ("Awards and Recognition," 2014).

In 2009, Luther Colleges Board of Regents approved the college's Sesquicentennial Strategic Plan. This plan guides all areas of college decision-making, including efforts related to climate change. Within the plan is a landmark initiative to ensure future carbon neutrality on Luther's campus through the year 2030. Equally important with this bold operational goal is Luther's commitments to integrate sustainability into the learning experience of every student and to find ways to weave their work on sustainability into related research and community outreach. As the Strategic Plan stated, "Sustainability education demands attention to the importance of place and community while simultaneously increasing students' awareness of cross-cultural perspectives and global interconnectedness" ("Transformed by the Journey a Climate Action Plan for Luther College," 2009).

Luther College professor and Winneshiek Energy District Board Member Jim Martin-Schramm is one of the most outspoken leaders on the Luther Campus as well as in the Decorah community for campus and community sustainability. For Martin-Schramm, sustainability is not only a community initiative, but also a personal commitment. As he stated regarding Luther's Strategic Plan, "It is rare to see sustainability goals articulated in a strategic plan such as this.... With sustainability, there needs to be both personal commitment and an institutional ownership in order to succeed" ("Luther Board of Regents

Affirm 'Green Initiatives' in Strategic Plan," 2014). Ultimately, once people see their neighbors going sustainable, the more likely for other people to also find ways to become more sustainable.

Luther College Solar Projects

Luther College has invested in several renewable energy systems over the past 20 years in order to power campus and reduce Luther's greenhouse gas emissions, including the production of a 1.6 megawatt wind turbine and providing an accelerated access to electrical cars on campus. Over the last few years especially, Luther College has taken advantage of vast opportunities to power campus with solar photovoltaic systems. One great benefit is that solar energy on campus has complemented the wind turbine and contributed to grid stability, as well creating an overall reduction of stress on the electric power grid. As solar energy availability is highest during the summer, wind is highest during the winter, which allows these energy sources to offset during peak times. This created the opportunity for massive solar projects on the Luther College campus. There are three such projects on the Luther College campus:

- 1) *Sustainability House*- The Sustainability House also known as Luther's Environmentally, Fiscally, and Socially responsible Edifice (LEFSE) uses 18 210-watt solar modules manufactured by Kyocera and a Fronius. The modules' cost of \$22,000 was paid for with funds provided by a donor during Luther's Sesquicentennial Fund initiative. The projected output is 5000 KWH, however the system is rated for 3780 watts due to cloud cover, weather change, and many other variables. These solar modules have a 20-year warranty though it is likely that these solar modules will be producing 70% of their rated power 50 years from now. On a daily basis, much of the solar power will be sent out to other utility customers because the Sustainability House uses less energy than the solar panels produce. Any excess production in the Sustainability House will be credited by Alliant Energy at the retail rate and with Iowa's net metering law, Luther College can draw on this financial credit ("Sustainability House," 2014).
- 2) *Shirley Baker Commons*:
 - 20kW solar panels
 - Estimated production of 26,500 kWh per year

- 50% in grant funding from the U.S. Department of Energy
 - 25% funded by an Alliant Energy rebate
 - 25% funded by donor gifts to the Renewable Energy line in the Luther College Sesquicentennial Fund
 - Two rows of panels, each 68 feet long
 - Production net metered through Alliant Energy (“Shirley Baker Commons, 20kW, 2014).
- 3) *Baker Village*- When constructed in 2012, it was the largest solar array in Iowa at the time costing nearly \$1.2 million. The 280 kW facility sits on the north edge of campus and powers an energy-efficient student housing facility called Baker Village. The solar array is estimated to produce 375,000 kilowatt hours of electricity annually which powers all electrical appliances as well as the geothermal heating and cooling system at the Baker Village. The energy produced from the solar array coupled with the geothermal heating and cooling systems, makes Baker Village a net zero emissions facility.

Luther College is leasing the 280 kW array from Decorah Solar Field, LLC, which is owned by a local Decorah resident, Larry Grimstad. Key for the investor was the cash grant option in lieu of the Investment Tax Credit for the project offered by the Department of Treasury during the recession. After the seven-year lease period ends, the college intends to purchase and own the facility. During the lease period, Luther College has contracted to sell the solar renewable energy certificates (SRECs) to the Winneshiek Energy District to reduce leasing expenses. Solar Renewable Energy Credits are tradable environmental commodities, each representing 1000kWh of solar energy generated by an eligible solar renewable energy system. The Winneshiek Energy District will resell these SRECs to other residents and businesses in Decorah that want to reduce their carbon footprint. In contrast to Luther’s wind turbine project, this particular solar project was much easier to create because Luther College is simply leasing the solar power system through a third party who can afford it. Utilizing Iowa’s net metering law, Luther College can draw on these credits when it uses electricity during cloudy days or when the

panels are snow-covered. Ultimately, Luther expects to pay less for the electricity from the array over the 25-year-rated life of the panels than it would to purchase electricity from the grid over the same time period (“Baker Village, 280 kW, 2014).

Power-Purchasing Agreements

The alternative to utility-owned solar farms such as the ones found at Luther College is a proliferation of rooftop solar systems installed by Decorah businesses and homeowners. One big positive with these types of solar panels is that they



do not produce any kind of noise. It makes them more suitable for both urban and residential areas.

Decorah businesses and households have pursued these solar projects through power-purchasing agreements where a developer arranges for the design, permitting, financing, and installation of a solar energy system on a customer’s property at little to no cost. The developer sells the power generated to the customer at a fixed rate that is typically lower than the utility’s retail rate. This lower electricity prices allows residents of Decorah the option to purchase electricity from the grid while the developer receives the income from these sales. Ultimately, Decorah homeowners and business-owners do not have to worry about installation, monitoring, or repairs. These no-money-down, third-party-owned residential solar leases have removed the significant hurdle of upfront costs making rooftop solar accessible to more homeowners than ever before.

Solar panel additions on a building or property also become a fixed assets as they cannot be moved. This means if property-owners want to sell, they will want that investment reflected in the valuation of their property value. With all of this in mind, there has been a growing interest especially within the city of Decorah for private businesses to invest in solar panels. Below are some of the many solar projects within the city of Decorah (“Winneshiek Renewable Energy Map,” 2014):

- Decorah Schools hosts a nine-panel solar photovoltaic array that was funded in part by the National Center for Appropriate Technology and by a grant from Alliant Energy.
- Decorah Bank & Trust- Installed solar panels on the roof of its building and on the drive-up teller window.
- West Side Dental- Installed solar panels on the south roof which will reduce electricity usage by 25%.
- Short Street Laundry- Installed solar panels on the roof of its building. Business owner Russell Novak says the panels now supply all the electricity needed to run the Laundromat (“This Laundromat is Solar-Powered,” 2014).
- Pizza Ranch- The 88-panel system and all the efficiency improvements are expected to payback in just over 8 years with electric savings around \$4,500 each year

Winneshiek Energy District

The Winneshiek Energy District was established in 2010 to guide the residents of Decorah and all of Winneshiek County in their investments in renewable energy through quality energy auditing and holistic energy planning. Sadly, many residents are not aware of the rebates and incentives available at the federal and state levels, so the Winneshiek Energy District seeks to inform and guide future sustainable projects. Andy Johnson, director of the Winneshiek Energy District, stresses the importance of making energy efficiency practical for all communities. As he stated, “It’s the cold beer and hot showers we want. The less purchased energy we need to provide those services and the more of our purchased energy we can provide locally, the better shape we’ll be in” (US Department of Energy, 2010 May).

The Winneshiek Energy District is modeled after the soil and water conservation districts found in almost every county in the nation. The Winneshiek Energy District has helped area residents invest more than \$1 million in energy efficiency programs. The district has worked closely with the Decorah Chamber of Commerce to establish a Green Business Council and the Green Business Challenge which helps local businesses track their energy consumption and greenhouse gas emissions. By forming a partnership between the city and the Winneshiek Energy District, the Decorah community was recently

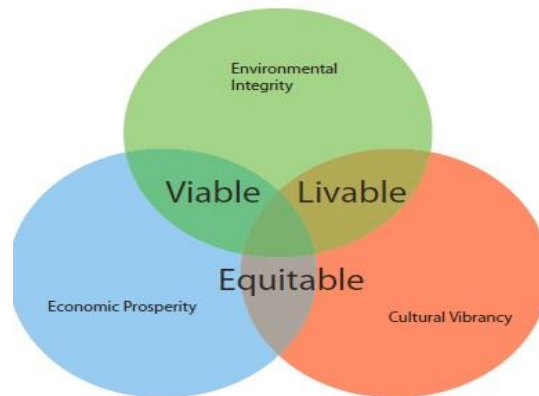
awarded a \$400,000 grant to do energy efficiency audits for households and small businesses (“Overview.” *Winneshiek Energy District*, 2014).

It is clear that organizations such as the Winneshiek Energy District are the catalysts for sustainable living in Decorah as these groups educate ratepayers about the financial incentives found with investing in renewable energy. Interestingly for many local ratepayers, the ability to find further information through the utilities regarding renewable investments has been very challenging. MidAmerican and particularly Alliant provide important financial and policy statements with renewable practices, specifically solar energy, under the title of “Distributed Generation” on their website. For many ratepayers, that is a subject line that would not be immediately searched. As a result, organizations such as the Winneshiek Energy District and Sustainable Decorah are so important in Decorah’s solar proliferation, because they encourage awareness and further education with the community. Ultimately, these organizations are there to stay in Decorah. As the Sustainable Decorah Strategic Plan stated, “Nowadays we face another perfect storm of economics (rapidly rising energy prices) and resources (human-induced climate change), and we believe an Energy District movement modeled after the Soil and Water Conservation District movement holds great promise” (City of Decorah, 2010).

Sustainable Decorah

In 2010, the City of Decorah commissioned *Sustainable Decorah*, a group focused on making Decorah as sustainable as possible. This group has led roundtable discussions, explored current sustainable efforts and developed a strategic plan for Decorah’s renewable practices. Underlining its strategic plan is the group’s vision statement, “Decorah, Iowa is a vibrant, livable, and just community. We embrace economic prosperity, social/cultural vitality, and environmental stewardship to create a sustainable legacy for generations to come” (Sustain Decorah, 2014). Sustainable Decorah’s vision statement can be articulated and visualized in Figure VII. Figure VII can also illustrate the framework of the Decorah community through the integration of economic prosperity, environmental integrity, and cultural vibrancy.

Figure VII



(Sustain Decorah, 2014).

For *Sustainable Decorah*, a sustainable Decorah would ensure long-term quality of life, not only at home, but at work, as well as in the community. For residents of Decorah, energy efficiency and the utilization of renewables can provide some insurance against disruptive climate change while also strengthening their local economy and communities. As will be seen below in *Sustainable Decorah's* three pillars, there are means for the elected officials, private businesses, non-profits and the public to join the process to live more sustainably while also ensure livable, viable, and equitable lifestyles.

Sustainable Decorah ("About," Sustain Decorah, 2014) focuses on three primary pillars:

1) **Cultural Vibrancy**

- Community Knowledge: Decorah is a community that values and promotes education for all, community engagement, responsible government and businesses.
- Active Living: Decorah is a community that values and promotes active living for everyone

2) **Environmental Integrity**

- Resource Use: Decorah is a community that values and promotes reducing, reusing, and recycling resources.

- Community Design: Decorah is a community that values and promotes the built environment of the past, present, and future which contributes to its sense of place and accessibility.
- Housing & Built Environment: Decorah is a community that values and promotes healthy, efficient, and affordable housing and built environment that contributes to community identity, and heritage

3) Economic Prosperity

- Energy: Decorah is a community that values and promotes energy conservation and renewable energy as a means to keep local dollars in the community and protect the environment.
- Local/Regional Economy: Decorah is a community that values and promotes local business and a resilient, diversified regional economy (“About” *Sustain Decorah*).

Community Culture

Such as with Decorah and Luther College, the undertaking of a community-wide sustainable movement begins with a key investor, whether it is an influential community member or a powerful business or organization in the area. In Decorah it is Luther College. Luther College’s commitment to integrate sustainability into the learning experience not only transcends into students’ lifestyles, but also into faculty at the college. These faculty members can then take these sustainable practices back to their household where their neighbors can get involved. Once ratepayers see their neighbor paying less in utilities while living a much more sustainable life, they begin to see sustainability as conceivable. Thus, the pursuit of investing in solar ceased to be a partisan issue for local policy-makers. All of this has led Decorah residents to be proactive in the pursuit of sustainable initiatives. As Decorah City Manager Chad Bird (2014) has said,

“The residents of Decorah tend to be well-educated and understand the long term impacts of sustainable practices not only for their own energy conservation but also for the lasting impact on society. The residents see the big picture, because of their education and identifying best practices of the community.”

Rural Solar

Solar projects are not just prolific in the city of Decorah, but also in the rural areas around Decorah. Interestingly enough, homes just northeast of Decorah consist of Iowa's highest concentration of non-Amish homes that are not connected to the power grid. Just as within the Decorah community, there is a focus on the personal commitment and community unification as one landowner in rural Decorah, Perry-o Sliwa states, "We do depend on others... We just don't depend on utility companies" ("Off the Grid: Decorah Community Lives on Solar, Wind Power," 2005). Dennis Pottratz, proprietor of GoSolar, a Decorah firm that sells and installs energy equipment, believes that people who rely on solar power look at the sun with a sense of appreciation causing community members to live as sustainable as possible.

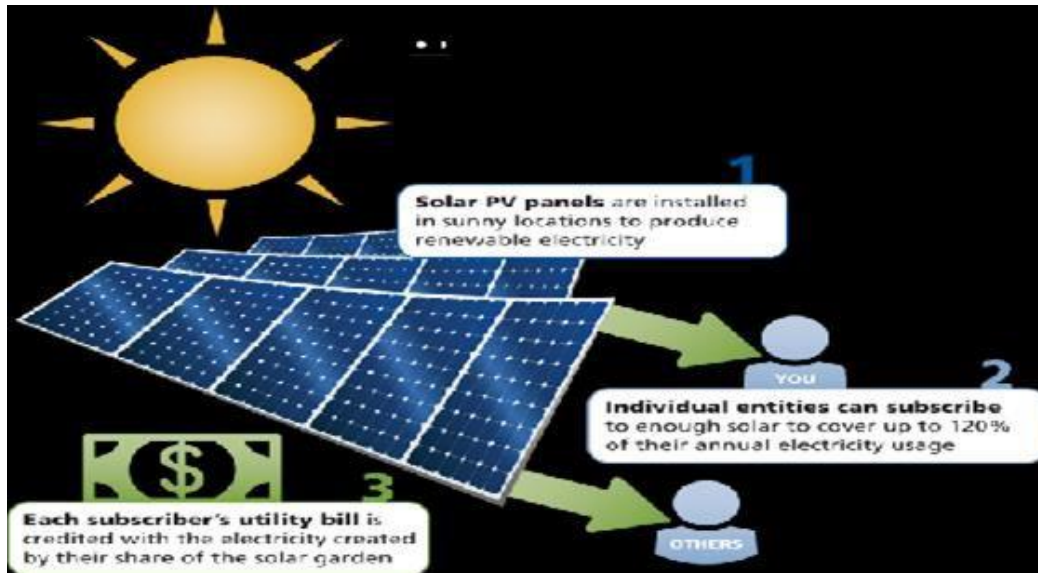
According to Michelle Kenyon Brown, Iowa Renewable Energy Association Membership Coordinator, about 5% of the 400 members of the Iowa Renewable Association live off the grid, but as many as half say they would like to. However, living off the grid takes some effort. People often have to manually move solar panels up to three times a day to catch the sun at the best time. They also have to monitor batteries to gauge whether to use or save power at any moment, but according to Dennis Pottratz an estimated \$15,000 investment in solar panels, wind turbine, and storage batteries would enable most families to generate their own electricity. Also, for those who build homes in remote areas not served by utility companies, the payback of this investment would be greatly accelerated ("Off the Grid: Decorah Community Lives on Solar, Wind Power," 2005).

Community Solar Garden

The new push within Decorah is towards a community solar garden which credits output to investors in proportion to their investment. As seen in Figure VIII, a community solar field could potentially allow Alliant customers in Decorah the ability to apply a percentage of production against their monthly electricity bills the same way other Alliant ratepayers take advantage of net-metering for solar panel systems installed at home or at their business. Alliant has said that they are exploring a

“community solar initiative,” but as of now, no details have been released (J Martin-Schramm, personal communication, 2014).

Figure VIII:



(Clean Energy Resource Teams, 2014).

Model

There are four primary reasons why Decorah is prolific in solar energy:

- 1) The tax credits offered through the State of Iowa and the United States Congress as well as the rebates offered through Alliant Energy.
- 2) Decorah residents have always been proactive in their pursuit of sustainable initiatives.
- 3) Collaboration with public, private, non-profit, and academic involvement that is often a very difficult synergy to capitalize on.
- 4) Decorah's focus on integrating economic prosperity, environmental integrity, and cultural vibrancy.

Is Decorah unique? Yes and no. According to Chad Bird, Decorah is unique in the state due to its demographic make-up, small private college with a major renewable initiative commitment, and their

grass roots can-do attitude pervasive in the electorate. However, it can be matched. According to Jim Martin-Schramm,

“Decorah can be a model because it is smaller compared to other larger communities, but also a bit bigger than a lot of communities in the state. The key is to have some early adopters who also have credibility and respect in the community. You also need someone (an installer, a non-profit, the city council) actively promoting solar” (J Martin-Schramm, personal communication, 2014).

Pilot Program

Communities in Iowa and across the United States can potentially use the Decorah model for solar energy proliferation. Just like in Decorah, a strong local control of solar energy assets through the building of small-scale solar projects and distributed energy facilities could greatly boost renewable practices in a community. The reality is that distributed generation, especially in Decorah, stimulated local economic development and entrepreneurship opportunities for investors and businesses that provided installation and maintenance services. In fact, Decorah now has six local solar installers where just a few years ago there was only one. For bigger cities, building a large national transmission system invites outside ownership of these assets, while local ownership of energy facilities found in solar panels and transmission lines provides more of an economic benefit to the local community.

Overall, each community that wants to pursue city-wide sustainability has to go at its own pace based on the resources present. It has to start with someone or some influential business in the community getting invested. In Des Moines, for example, if companies such as Wells Fargo, Principal Financial, or Nationwide/Allied Insurance happen to get invested in solar projects, Des Moines residents would see the correlation with sustainable living and economic development. As with Luther College, the major employer in Decorah, employees can get involved in sustainable living and community residents can also see legitimacy in energy efficiency tied with local economic development. Once residents get involved, it becomes a local initiative for public officials to handle. Once brought to the public debate, public officials have to assess the city and set reasonable goals that can be reached.

Inevitably, if local municipalities can reduce the soft costs of solar installations of customer acquisition, permitting, inspection, and interconnection, it would bring more customers into the solar market. Looking at city administration, cities have to focus on the efficiencies that come with renewables and incorporating renewable efforts in the political process. Setting reasonable goals for the community allows residents to grasp and understand the situation and take then ownership of their own community. While many residents can afford a longer return of investment, it is still taxpayer dollars and the citizen's appetite may not be there for a large capital expenditure no matter how sustainable it may be. With that, public, private, and potential non-profit organizations then are all fighting for the same cause, leading to inevitable sustainability successes.

Recommendations

Policy Recommendations:

- Extend the Federal solar tax credit beyond 2016 that enable homeowners and business owners receive a tax credit for 30% of the installed cost. This credit along with Iowa's Solar Systems Tax Credit can off-set up to 50% of the upfront costs of solar installations.
- Increase or remove the solar tax credit limit cap that is in place for the State of Iowa solar tax credit program.
- Extend the tax abatement of on solar PV systems from 5 years to 10 years to correspond with other property tax incentive programs that are offered.
- Congress should institute a revenue neutral carbon tax, which would drive up the cost of fossil fuel and make energy efficiency and renewable energy more affordable.
- The Investor Owned Utilities have an opportunity to continue to satisfy their investors while at the same time offering a satisfactory option to utility users by building and developing community solar projects that could meet the needs of more Iowans. Policy-makers at both the state and national level could look at implementing incentives to encourage this type of IOU development

Utilities Recommendations:

- Ease the transmission and connectivity of individuals and businesses that produce solar energy. With easy access to the grid and uniform standards for net metering, more consumers will be willing to install solar PV.
- MidAmerican Energy’s link to the solar energy generation requirements on their website is labeled ‘Distributed Generation.’ A policy change to increase customer education and access to information would be to either increase awareness of what distributed generation and customer-owned generation are or change the language on the utility website to be more indicative of what these resources are.
- There is a need to move towards sophisticated pricing methodologies that can incorporate the benefits of renewable energy and energy efficiency, which this will change the energy generation market as we know it today.

Potential Solar Projects Recommendations:

- While having major population centers embrace solar energy will be key to its expansion in Iowa, the state’s agricultural sector has opportunities to benefit from solar technology. Solar panels can be installed on hog or poultry confinements to help offset their energy costs while producing clean, renewable energy.
- Create community solar gardens which allows the pooling of resources and can save communities money and give subscribers a lower cost than going it alone.
- Drake University recently announced it is constructing a \$65 million STEM (Science Technology Engineering and Mathematics) building on its campus. To promote technology, and lead on clean energy like Luther College does in its community, Drake should install rooftop solar PV on the new facility.

Conclusion

In conclusion, it is clear that renewable resources reduce the amount of carbon dioxide and other toxic emissions in the fight against climate change. Developing clean renewable sources of energy also makes overall energy prices more stable by protecting ratepayers against rising coal and gas prices. When considering the potential solar resource of Iowa, there are a multitude of factors: not only does an abundant amount of solar energy reach the state, Iowa has abundant land areas and buildings that are suitable for solar projects set up. All of this has led to a significant surge in the generation of renewable energy, especially solar power in Iowa. This push has led to different interest groups vying for significant influence in renewable energy policy-making. There are the energy users and consumers who may be motivated by concern for the environment or desire to be off the grid. There are electric utility providers who have an obligation to meet the needs of all electricity users by providing a safe, reliable and affordable form of electricity. “Distributed Generation” as the utilities have characterized as small, grid-connected devices such as wind and solar power allows for energy production by individual ratepayer households and businesses at or near the point of use. Distributed generation especially through solar power stimulates local economic development and entrepreneurship opportunities for investors and businesses who provide installation and maintenance services. Solar projects offer many other benefits: job creation, consumer savings, cleaner air and water, innovation and technology investment, and improved stability in the electric grid. As a result, Iowa has the outstanding opportunity to become a national leader in solar proliferation just by utilizing the agricultural sector to benefit from solar technology.

Finally, there are also policy-makers both locally and nationally who try to craft policy that meet the needs of their constituencies. As current Iowa Governor Terry Branstad crafted teams in order to promote the standardization of net metering and evaluate policy options at the local and state levels to further reduce soft costs of solar installation, solar enthusiasm continues to mount across Iowa.

The financial incentives for solar panels are very attractive as state and local governments have both been promoting renewable energy by providing green-loans and tax credits. This is helping more and more users the ability install solar panels. However, some of the biggest obstacles for ratepayers in the pursuit of renewable energy are awareness and cost. Sadly, many Iowa residents are not aware of the rebates that are offered through their utility and through the state. This can be due to several reasons including solar power being characterized under an unfamiliar title of “Distributed Generation.” Thankfully in Decorah, residents have private, public, and non-profit organization that are all fighting for the same goal which greatly encourages public awareness. No longer is sustainability a partisan issue, it is something everyone can visualize and grasp. Ultimately, the reality is that solar adoption early through locally-led planning and mobilization can get communities like Decorah to thrive on local ownership and meeting specific climate goals. If other communities can follow this model, solar proliferation may ensue in Iowa. As Andy Johnson, Winneshiek Energy District Director put it in an interview:

“State and federal policy, and technology advances, are absolutely critical and exciting, and the energy world is changing faster than anyone anticipated just a few short years ago. However, locally-led energy planning and investment is the last missing link where there is tremendous untapped potential for both creating on-the-ground change, and building the energy transformation movement” (A Johnson, personal communication, 2014).

Looking forward, it will be interesting to see particularly with the recent *Eagle Point* case, whether Iowa legislators take a more supportive position towards renewable energy. Also, with the continual decline of solar costs, will the need for rebates continue? Finally, will the public push their elected officials to pursue renewable practices? In our opinion, if the recommendations that were previously mentioned were addressed, the state of Iowa may become a national leader in solar energy as it is with wind energy and ethanol production.

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