URBAN AND REGIONAL PLANNING
University of Wisconsin—Madison

RENEWABLE ENERGY CREDIT SERVICE AGREEMENTS:

A UNIQUE APPROACH TO SOLAR FINANCING IN THE CITY OF MONONA

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EXECUTIVE SUMMARY

This case study considers the City of Monona's recent installation of a third-party financed solar project. The purpose is to demonstrate the unique financial benefits of third-party financing (TPF) arrangements to Wisconsin municipalities when meeting renewable energy goals. When government interfaces with for-profit investors on solar installation projects, it can reduce energy expenses significantly as well as achieve broader environmental objectives.

This analysis utilizes internal rate of return, discounted cash flow analysis and benefit-cost analysis to determine financial viability for the Monona project. It demonstrates the financial viability of TPF solar above and beyond traditional sources of financing such as municipal bonds or loans. Monona's financing arrangement achieves discounted cash flow savings of $263,188 over the life of the project, reduces the levelized cost of electricity over the life of the panels by about 60 percent from $0.22/kWh to $0.09/kWh, and achieves a benefit-cost ratio of 1.89 over traditional financing options. The cost assessment is also robust across a wide range of sensitivity tests, including various electricity and discount rates.

While the financial benefits for municipalities like Monona are significant, planners should note that the legal standing of TPF arrangements in Wisconsin is undetermined. Although Monona's case is strong, the State has not ruled on whether a third-party investor constitutes a utility and is subject to oversight. Further court cases or legislative action may be necessary to clarify TPF in Wisconsin.

INTRODUCTION

On July 22, 2013, the City of Monona approved an agreement with an investor, Falcon Energy Services, to install nearly 157 kW of solar PV panels on the roofs of four municipal facilities (Covelli 2013). This arrangement was the result of months of planning and approval, including meetings with the Sustainability Committee, the Finance Committee, the Plan Commission, the Library Board, the Parks Board, the Public Works Committee and the City Council (Glaeser 2013a). It is the unique financing arrangement of this agreement that made it particularly attractive for Monona's stakeholders. Monona was able to significantly reduce its cost of entry into the solar market by signing what is termed a third-party financing (TPF) agreement.

This paper evaluates this TPF arrangement through a cost assessment and comparison of multiple financing options available to Monona. As Monona has already chosen TPF, this is simply a retrospective case study of their financial decision, which other municipalities may find useful for pursuing their own solar projects. First is an overview of TPF, some background on the Monona project, as well as some project details. Second, this evaluation considers various financing options for solar development in Monona using multiple economic analysis methods including discounted cash flow and benefit-cost analysis. The evaluation also includes sensitivity testing to ensure that the lowest cost options are considered. Finally, it concludes with a set of recommendations for the City of Monona as well as other municipalities looking to replicate Monona's success.

THIRD-PARTY SOLAR FINANCING

Photovoltaic (PV) solar is experiencing a build-out of generating capacity in the United States. Yearly additions to cumulative capacity have hovered near or above 50 percent for the last decade (Barbose et al. 2013, 9). Installations now total over 6,700 MW of grid-connected capacity; in comparison, only 52 MW of capacity existed in 2002 (Gelman and Gossett 2013, 67).

Other than a dramatic drop in cost, one significant reason for the solar boom has been the growth of unconventional financing arrangements (Drury et al. 2012). Traditionally, solar projects have been financed with cash or conventional loans, leaving such projects out of reach for lower-income homeowners or cash-strapped municipal governments. TPF offers electricity consumers a low-risk solution without the high upfront costs associated with traditional financing options. In a TPF solar project, a utility customer contracts with a third-party to install, own and operate solar panels installed on the customer's property. The favorability of such TPF agreements has led to rapid adoption. Virtually unheard of in 2005, TPF projects represented around 60 percent of all systems installed in 2012 nationwide (Drury et al. 2012, 632).

Until Monona's groundbreaking project discussed below, only two types of TPF contracts existed: Leases and Power Purchase Agreements. Solar Leases are generally structured like other equipment leases. Lessee's make pre-established monthly payments to the leasing company in exchange for consuming the panels' electricity. In a Solar Power Purchase Agreement (SPPA) the customer, often a municipal government, pays an agreed-upon electricity rate to a third party for energy produced by the panels installed on the customers roof. Customers may also collect funds from the third party for use of the roof or land through lease payments. The third party, typically an LLC formed by an investor and a developer, makes all capital investments for the project and is paid back through electricity sales over the life of the agreement (Cory, Coughlin, and Coggeshall 2008).

PROJECT DETAILS

- The panels are owned by a third party investor, Falcon Energy Services, LLC.
- The project developer Solar Connections, LLC helped craft the TPF agreement and bring the parties together.
- PV panels are installed on the roofs of Monona City Hall, Monona Public Library, a public service garage, and a water pumping station ("Renewable Energy Credit Service Agreement" 2013, 28).
- The panels are TenK Solar's RAIS XT 410W-P, which produce 116.5 W/m2 ("Renewable Energy Credit Service Agreement" 2013, 27).
- The panels provide up to 156.62 kW of power and will provide around 224,000 kWh of electricity in the first year ("Renewable Energy Credit Service Agreement" 2013, 26).
- The expected lifespan of the panels is at least 25 years, although inverters may need to be replaced before that time.
- The panels will produce 48 percent of expected energy demand at the four sites and about 10 percent of expected demand at all city facilities (Glaeser 2013b).

The benefits of SPPAs are numerous. No upfront capital is necessary, while providing a simplification of costs and revenue streams. Electric rates through an SPPA are typically fixed or escalate on a predetermined schedule, and can be competitive with utility rates depending on the market. In addition, because the third party owns, operates, and maintains the panels, the customer bears none of the technological or financial risks inherent in owning high-value technology (Cory, Coughlin, and Coggeshall 2008; Shah 2011).

For local governments, there are unique financial benefits. Because municipalities like Monona are generally non-profit entities, they cannot reap federal tax benefits such as the Solar Income Tax Credit (ITC) and the five year Modified Accelerated Cost Recovery System (MACRS) depreciation calendar for traditionally financed solar installations. By partnering with for-profit entities who can use the ITC and MACRS benefits to reduce their tax burden by 40-60 percent of the PV system's value, public entities can reap the financial benefits through the electricity rates of the SPPA (Cory, Coughlin, and Coggeshall 2008, 21).

BACKGROUND ON MONONA AGREEMENT

Monona's project stems from Monona's *25 x 25 Plan for Energy Independence*, in which Monona committed to sourcing 25 percent of its electricity from renewables by the year 2025. This plan outlined immediate and long-term action steps related to energy efficiency and renewable energy, including installing solar panels on multiple city facilities ("25 X 25 Plan for Energy Independence" 2010). The TPF agreement is a major step toward that goal.

For reasons discussed later, TPF has yet to penetrate Wisconsin's solar market, making Monona's project a groundbreaking one. The Monona arrangement is unique in that, instead of selling electricity, which is provided free of charge, the third-party provider sells Renewable Energy Credits (RECs) to the City. RECs represent the green attributes of one MWh of electricity and were originally designed to allow utilities to meet Renewable Portfolio Standards (RPS) set by state governments. While the Monona contract is similar to an SPPA, and achieves all of the same benefits for the City, it is technically a Renewable Energy Credit Service Agreement (RECSA).

PROJECT ANALYSIS

METHODOLOGY

This cost assessment demonstrates the considerable financial benefits of TPF to the City of Monona and the potential of TPF to other municipalities. The assessment considers three different scenarios:

0. Business as Usual: Continuing to purchase electricity from Madison Gas and Electric Company (MGE)
A. Traditional Financing: Purchasing PV panels through a conventional loan or municipal bond
B. Third-Party Financing: Purchasing RECs for eleven years from the third party and taking advantage of the buyout option specified in the RECSA

Several methods are used, including discounted cash flow (DCF) analysis, benefit-cost analysis (BCA) and internal rate of return (IRR). The end result of the DCF analysis is the net present value (NPV) of the project, or its value in today's dollars. The NPV of a scenario is useful for determining the levelized energy cost (LEC) per kWh. Costs and benefits are calculated mid-year to present a more accurate value, although roof lease payments are taken at the beginning of the year as specified in the contract. Business as Usual (BAU) is considered an avoided cost for the sake of BCA, and an actual cost in the DCF analysis

The equations used are available in Appendix A. Calculations were computed in Microsoft Excel and can be reviewed in Appendix B. For the sake of brevity and simplicity, only the results are discussed in the body of this report. In addition, the analysis was completed with data from a preliminary contract and information available when the Monona City Council approved the project on July 22, 2013. Negotiations were still underway when this analysis was completed, and the exact details of the final contract may change some of the results.

COMPARISON OF FINDINGS

A comparison of the findings from all three Scenarios shows that the TPF project is clearly an improvement in cost savings over traditional financing and significantly offsets electricity costs for the city over the life of the project. The graph on the following page demonstrates the significant cost savings of the TPF Scenario compared to others:

ENERGY ECONOMICS DEFINITIONS

Discounted Cash Flow (DCF)
Useful for determining the attractiveness of a project based on the "time value" of money, which is determined by the discount rate *d*

Benefit Cost Analysis (BCA)
Useful for comparing a project to a base case, the end result of which is a benefit cost ratio (BCR)

Internal Rate of Return (IRR)
The discount rate at which a project "breaks even;" useful for comparing the profitability of various investment options

Net Present Value (NPV)
The value of a project in the present, discounted; the standard calculation in DCF to value a capital project

Levelized Energy Cost (LEC)
The levelized cost of a project per energy unit produced, in this case kWh

Net Present Value Savings (NPV [B-C])
The discounted savings of the project over business as usual, or the net present value of its benefits minus its costs

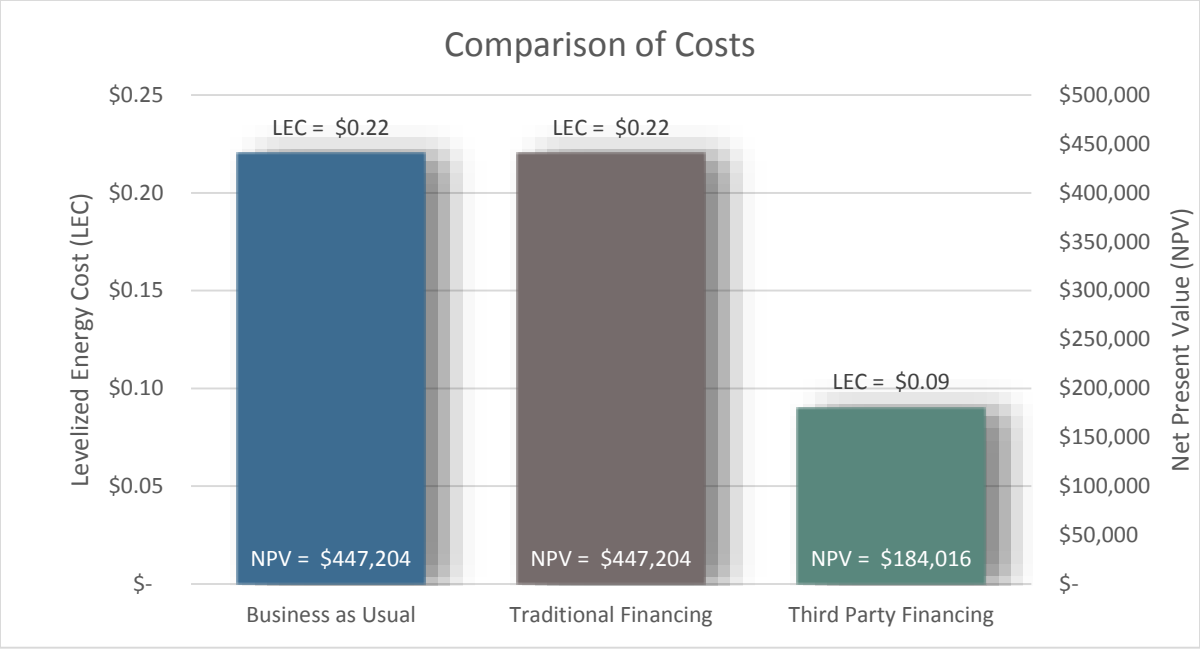

Figure 1: Comparison of Costs

The NPV of BAU and traditional financing scenarios are over twice the amount associated with the TPF agreement. In fact, the TPF scenario is so favorable that the levelized energy cost ($0.09/kWh) is *lower* than the present day cost of electricity from MGE ($0.11/kWh)[1]. Savings are further demonstrated by the first year costs associated with each scenario in the graph below:

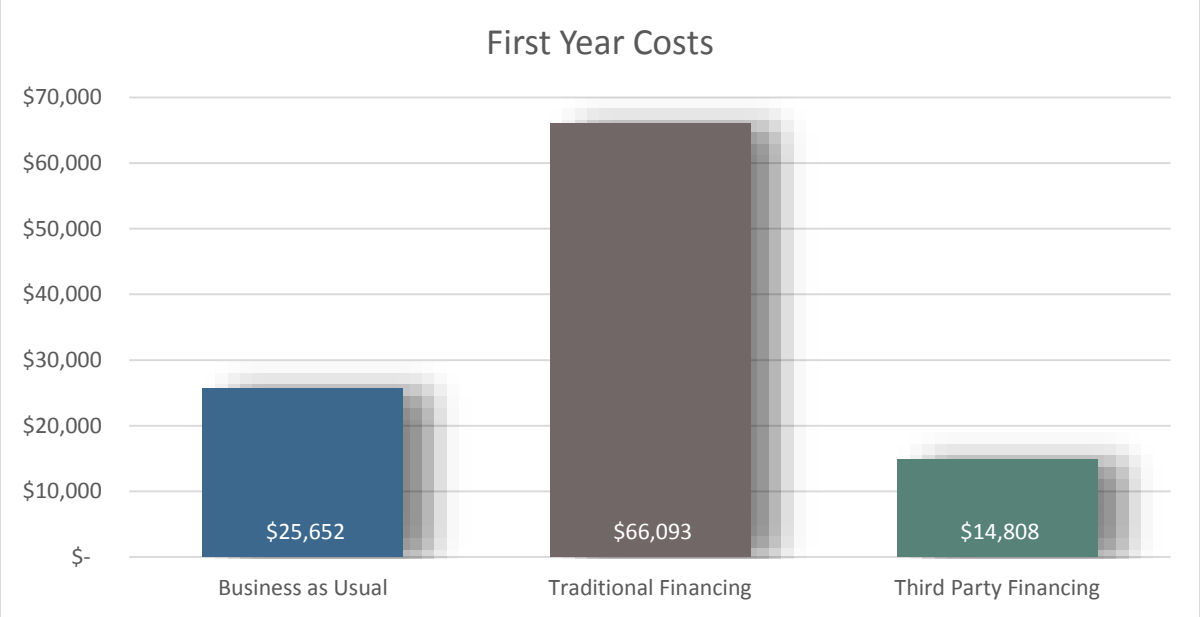

Figure 2: First Year Costs

[1] Scenario 0 and Scenario A have the same values. This is no accident: The discount rate *d* is the opportunity cost or the IRR for Scenario A, which makes NPV_A equal to NPV_0. More explanation of this result is included in Appendix A.

The costs listed are for 223,916 kWh of electricity or their REC equivalent. First year cost savings for the TPF scenario are estimated at $10,844 over BAU. The discounted cash flow savings over BAU from the TPF Scenario for each year through 2038 is shown in the graph below along with traditional financing:

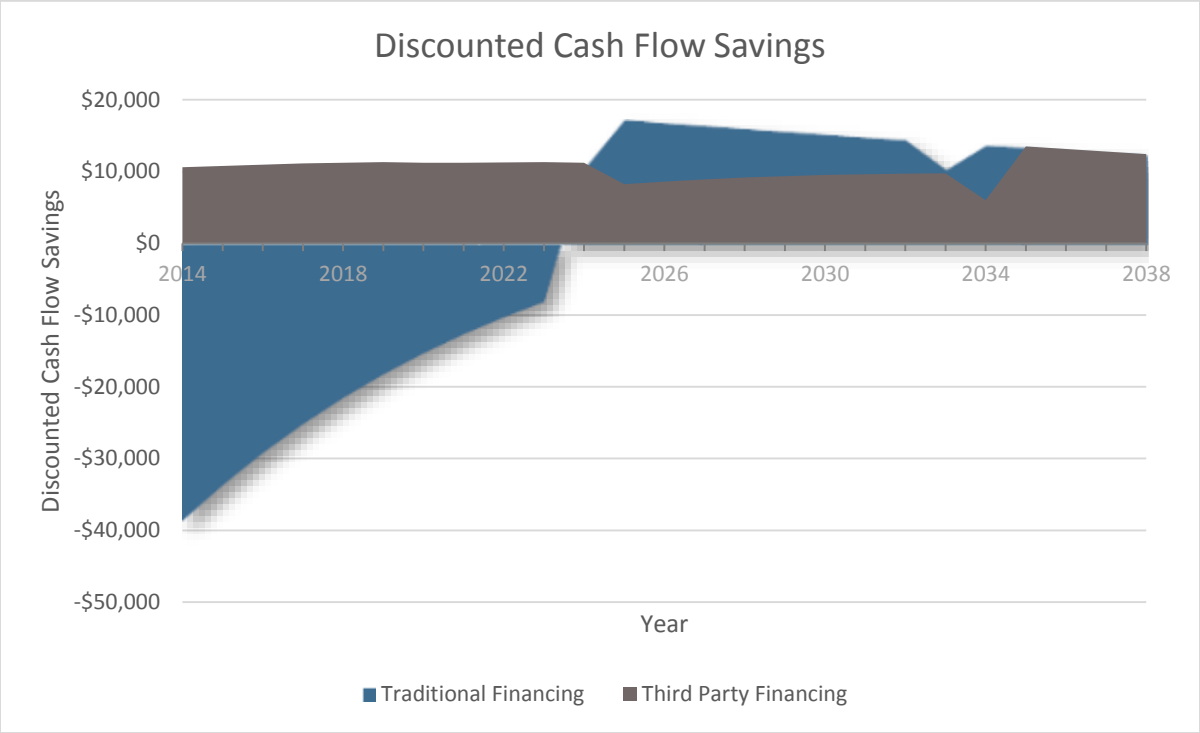

Figure 3: Discounted Cash Flow Savings

There are no years in the TPF scenario in which projected costs will outweigh projected benefits. In contrast, the significant upfront costs associated with traditional financing greatly decreases its favorability in comparison. The sum of all present value cash flow savings of the TPF scenario—the total value of savings to Monona—is $263,188. This value is the difference between the NPV of benefits and costs, yielding a benefit-cost ratio of 1.89, which means benefits are 89 percent higher than costs over the life of the project.

SENSITIVITY TESTING

In performing this analysis, two important assumptions were made. These were:

- The discount rate is equal to the opportunity cost of choosing traditional financing (9.7%)
- The electric utility escalation rate is based on past rate increases (7.0%)

These values were changed to show the robustness of the TPF arrangement to a number of different alternative scenarios. The effect of changing the discount rate is considered in the Appendix, but is not discussed here as the favorability of the TPF scenario was robust to a large range of discount rates.

Electricity rates are perhaps one of the most unpredictable variables in this analysis. While the escalation rate for the initial analysis was chosen based on historical data, one could easily envision scenarios in which rates increase at a lower rate or even decrease. It is also clear that at some escalation rate, the TPF scenario would become a financially unsound investment.

This rate was determined to be about -4.2 percent; that is, electric rates would have to decrease at 4.2 percent every year for the 25-year project life for the TPF project to reach its "break even" point, while a higher rate makes the scenario profitable. Because it is difficult to imagine a 25-year period in which MGE prices decrease at all—Wisconsin historical commercial electricity rates have decreased in only four of the last 22 years ("Average Retail Price of Electricity" 2013)—the cost savings of the TPF scenario are fairly certain. A graph of tested electricity escalation rates and projected savings is below:

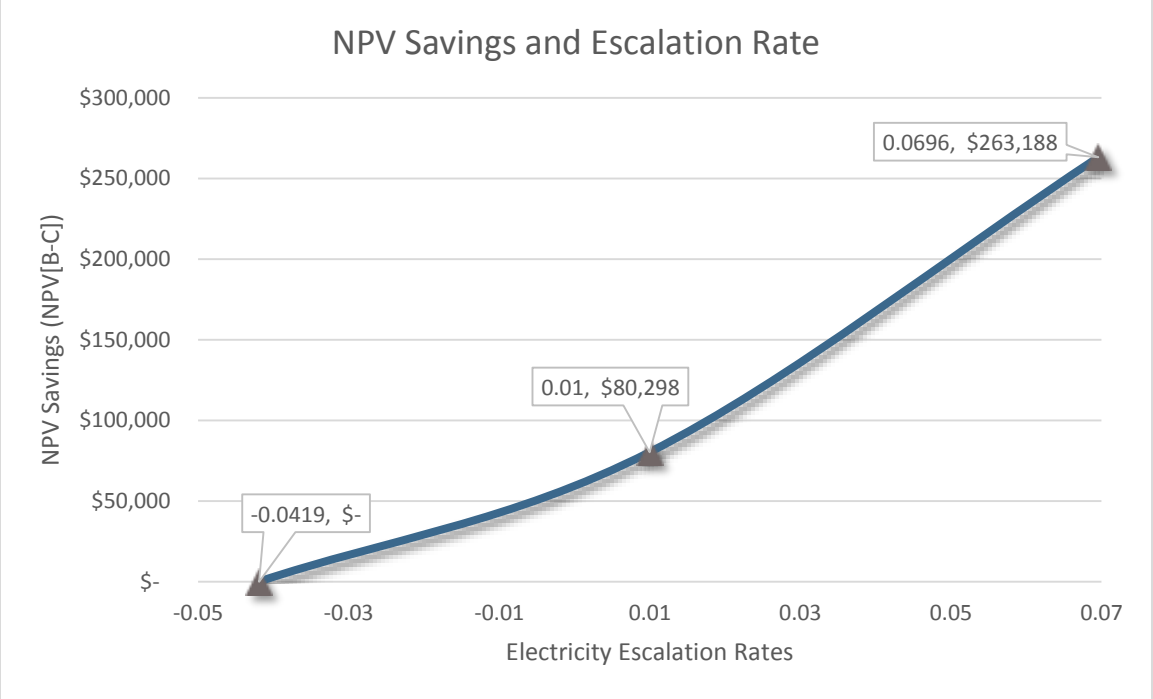

Figure 4: Net Present Value Savings and Escalation Rate

CONCLUSION

RECOMMENDATIONS FOR MONONA

Based on the analysis conducted above, Monona has clearly made a sound financial decision, even considering variability in electricity rates. However, Monona stands to gain even more if it considers future investment opportunities with the same financial rigor. A list of recommendations for Monona policymakers and planners follows:

1. **Consider Delaying System Purchase**: While Monona is limited by the contract terms from purchasing the panels until 2020, a clause in the contract allows for a buyout at "fair market value" after that date or a continued RECSA renewed on a yearly basis. Postposing purchase of the panels may allow Monona to achieve further cost savings. Indeed, the year 2025 seems to be an ideal year to purchase the panels in order to meet its commitments outlined in the *25 x 25 Plan* ("25 X 25 Plan for Energy Independence" 2010). The graph below outlines savings derived from three different purchasing dates:

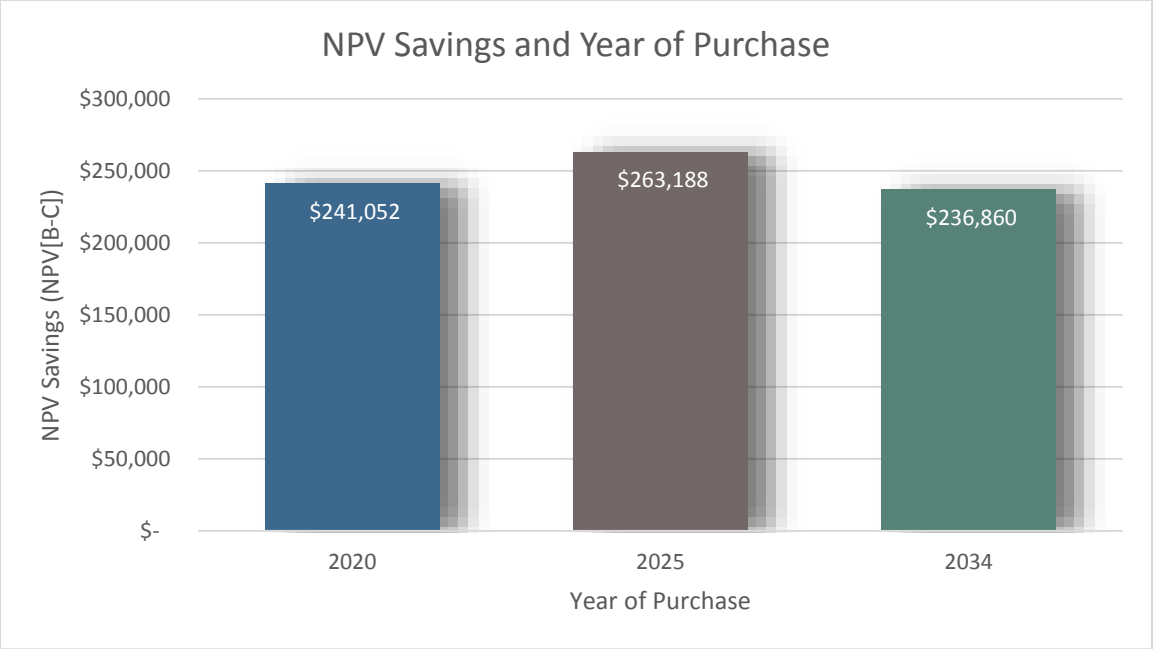

Figure 5: Net Present Value Savings and Year of Purchase

2. **Complete a Decision Analysis**: A thorough decision analysis could explore the impacts of the TPF decision on future decisions, and the effects any future decisions might have on Monona's finances. Such an analysis could determine the path that maximizes cost savings and meets Monona's renewable energy objectives.
3. **Rerun Cost Assessment Calculations after Contract Term:** While 2025 seems to be the ideal year to purchase the panels through the contract buyout option, further analysis is necessary to confirm this. A BCA and DCF analysis should be performed again once the initial agreement period is finished, taking into consideration actual retail electric rates, the price of the system, and any new contract terms. This analysis would compare continued REC purchases to the buyout option, eliminating the BAU scenario. In reality, there are currently too many unknowns to properly identify the proper purchase year.
4. **Use Financial Analysis for Future Projects**: A final recommendation is that Monona use an analysis similar to the one used in this report when exploring future solar projects. The panels installed during this project produce about 10 percent of Monona's electricity demand. If Monona is to meet the goals outlined in its *25 x 25 Plan*, it will need to install 240 kW of additional solar panels, purchase additional RECs on the open market, and/or further reduce its energy expenditures. The financial implications of the City's choices are fundamental to the decision-making process.

REPLICABILITY AND FINANCING IMPLICATIONS

Municipalities looking to address issues like energy scarcity and climate change should take note of Monona's solar financing arrangement and consider the financial benefits therein. Jurisdictions with current retail electric rates of at least $0.06/kWh could benefit financially from an arrangement similar to Monona's. The graph below shows discounted cash flow savings depending on the starting commercial electricity rate. The electricity escalation rate is assumed to be the statewide average

historical commercial electricity escalation rate from 2001-2012 (4.8%) ("Average Retail Price of Electricity" 2013).

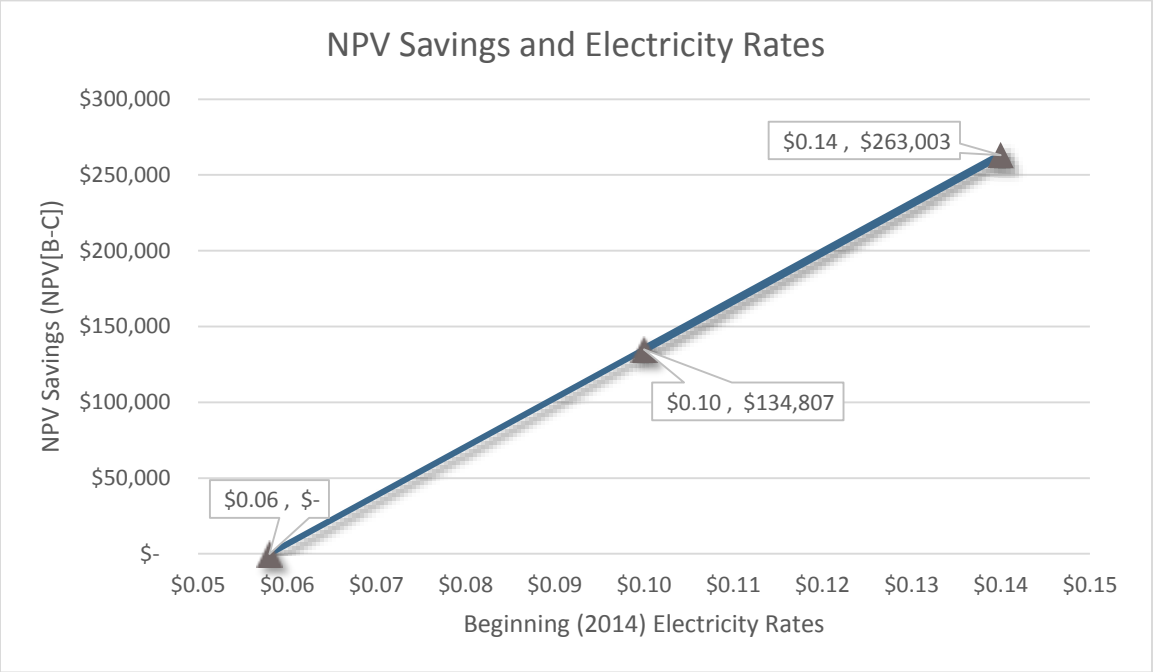

Figure 6: NPV Savings and Electricity Rates

The terms of the agreement may change any other project's profitability significantly, however. Monona was able to secure some very favorable roof lease and REC purchase rates from the investor, as well as an REC buyback clause that further improved cost savings. Whether other municipalities can arrange similarly favorable TPF agreements will depend on negotiations with potential investors.

PLANNING AND POLICY IMPLICATIONS

There are some planning and policy obstacles to overcome before TPF PV installations can flourish in Wisconsin. TPF has not been widely used due to the ambiguity in what constitutes a "Public Utility." In Wisconsin Statutes Chapter 196, the State defines a utility as:

> Every corporation, company, individual, association, their lessees, trustees or receivers appointed by any court, and every sanitary district, town, village or city that may own, operate, manage or control any toll bridge or all or any part of a plant or equipment within the state, for the production, transmission, delivery or furnishing of heat, light, water or power either directly or indirectly to or for the public (*Regulation of Public Utilities* 2011).

The City of Monona has found one way to work around this definition. First, the system is sized such that at any given time, the panels do not produce more power than what could be consumed on site. This avoids any sale of electricity back to the grid via Madison Gas and Electric Company's (MGE) net-metering agreement and preserves the client as a singular customer. In addition, the provider is a singular LLC, which provides power free of charge to City of Monona facilities only. The final mechanism is largely in the wording of the agreement: Instead of selling electricity, the third-party provider sells RECs to the City. The generation and sale of RECs is not subject to the same regulatory standards and control as electric power.

For other municipalities, TPF may work, but it largely depends on the specific circumstances of the project and the parties involved, including the public utility provider. As Kurt Reinhold of Solar Connections conveyed in an email correspondence, “There are multiple ways to structure a solar project to comply with utility laws that are in place; but, the handling of a REC Service Agreement is very touchy, and requires parties to be fully aware of multiple angles of interpretation for both state statute as well as PSC rules governing interconnection. New models for structuring these kinds of agreements are already emerging that can make the process run more smoothly.” (Reinhold 2013).

Policy solutions also exist that could allow TPF to flourish in Wisconsin. At least 23 states, including California, Colorado, Oregon and more recently Iowa, have dealt with the uncertain status of SPPAs through Public Utility Commission orders, legislative acts, or court cases to exempt third-party solar from regulation (“3rd-Party Solar PV Power Purchase Agreements (PPAs)” 2013; Lydersen 2013). In Wisconsin, the non-profit group RENEW Wisconsin has proposed Clean Energy Choice legislation that would explicitly exempt third-party renewable energy systems from the definition of a public utility (“Sign on to Statement of Support for Clean Energy Choice” 2013). Planners and policymakers in communities looking to use TPF in the future should consider supporting this effort by signing the statement of support on RENEW’s website, as a number of Wisconsin counties and cities have already done. Interested local governments should also lobby the State legislature to take action on this issue.

Regardless of what happens at the state level, Monona has clearly broken new ground on solar financing in Wisconsin, while their use of a RECSA is likely a first in the nation for municipal-scale solar. The fact that Monona was able to accomplish this while saving as much money as they did is evidence that with current incentives solar is at grid parity in Wisconsin.