BEFORE THE
PUBLIC SERVICE COMMISSION OF WISCONSIN

Application of Wisconsin Power and Light Company for Authority to Adjust Electric and Natural Gas Rates

Docket No. 6680-UR-124

DIRECT TESTIMONY OF ERIC BORDEN ON BEHALF OF CLEAN WISCONSIN

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I. INTRODUCTION AND QUALIFICATIONS

Q Please state your name, title, and employer.

A My name is Eric Borden. I am a Principal Associate at Synapse Energy Economics ("Synapse"), located at 485 Massachusetts Avenue, Suite 3, Cambridge, MA 02139.

Q Please describe Synapse Energy Economics.

A Synapse is a research and consulting firm specializing in electricity and gas industry regulation, planning, and analysis. Our work covers a range of issues, including economic and technical assessments of demand-side and supply-side energy resources; energy efficiency policies and programs; integrated resource planning; electricity market modeling and assessment; renewable resource technologies and policies; and climate change strategies. Synapse works for a wide range of clients, including attorneys general, offices of consumer advocates, public utility commissions, environmental advocates, the U.S. Environmental Protection Agency, the U.S. Department of Energy, the U.S. Department of Justice, the Federal Trade Commission, and the National Association of Regulatory Utility Commissioners. Synapse has over 40 professional staff with extensive experience in the electricity industry.

Q Please summarize your professional and educational experience.

A I hold a Master's degree in Public Affairs with a concentration in Energy and Environmental Policy from the University of Texas at Austin LBJ School. My undergraduate degree is in finance and entrepreneurship from Washington University in St. Louis. I have over ten years of experience in the energy and utility regulation space and have testified as an expert witness in multiple jurisdictions across North America.

At Synapse, I conduct economic, environmental, and policy analysis of energy system technologies, planning and regulations associated with both supply- and demand-side resources. I have worked on numerous utility ratemaking, rate design, and cost allocation proceedings. My resume is attached as Ex.-CW-Borden-1.

Q On whose behalf are you testifying in this case?

A I am testifying on behalf of Clean Wisconsin.

Q Have you previously testified in regulatory proceedings in Wisconsin?

A No.

Q Have you previously testified in proceedings before other state commissions or agencies?

A Yes. I have testified on numerous occasions before the California Public Utilities Commission in California, as well as before similar regulatory bodies in Maine, Maryland, Illinois, South Carolina, and Nova Scotia (Canada).

Q What is the purpose of your testimony?

A Synapse was retained by Clean Wisconsin to review and provide an expert opinion on the application of Wisconsin Power and Light's ("WPL" or "Company") to change their current net energy metering ("NEM") tariff. The Company proposes a transition for solar customers, from NEM (called Parallel Generation) to a different rate structure called the "Power Partnership" tariff. My testimony is focused on the impact of these changes for residential customers.

Q What materials did you rely on to develop your testimony?

A I rely on the utility's workpapers and exhibits, testimony, discovery responses, and a National Academy of Sciences net metering report.[1] Specific references are noted in my testimony where applicable.

Q Was your testimony prepared by you or under your direction?

A Yes. My testimony and the accompanying exhibits were prepared by me or under my direct supervision and control.

Q Are you sponsoring any exhibits with your testimony?

A Yes, I am sponsoring the following exhibits:

Ex.-CW-Borden-1: Resume for Eric Borden

Ex.-CW-Borden-2: The Role of Net Metering in the Evolving Electricity System (excerpts)

Ex.-CW-Borden-3: WPL Response to 1-DC-7: 1-DC-DR-7 Attachment, DG Forecast 2023_06_W (excerpt)

Ex.-CW-Borden-4: Governor Evers' Executive Order 38

Ex.-CW-Borden-5: Alliant Energy, "Clean Energy Vision and Goals"

Ex.-CW-Borden-6: Focus on Energy 2021 Rooftop Solar Potential Study Report

Ex.-CW-Borden-7: Achieving 100% Clean Energy in Wisconsin

Ex.-CW-Borden-8: WPL Response to 2-CW-5&6 2022 (excerpt)

Ex.-CW-Borden-9: Focus on Energy Calendar Year 2022 Evaluation Report, Volume III (excerpt)

[1] National Academies of Sciences, Engineering, and Medicine. 2023. The Role of Net Metering in the Evolving Electricity System. Washington, DC: The National Academies Press https://doi.org/10.17226/26704 (referred to herein as "NAS Study"). This citation is not record evidence. Relevant excerpts are provided as Ex.-CW-Borden-2.

Ex.-CW-Borden-10: The Uniform Methods Project: Methods for Determining Energy-Efficiency Savings for Specific Measures, Chapter 10: Peak Demand and Time-Differentiated Energy Savings Cross-Cutting Protocol

Ex.-CW-Borden-11: WI PBR Workshop #4, Priority Goals and Outcomes for Metric Development, PSC Ref # 454393

II. SUMMARY OF FINDINGS AND RECOMMENDATIONS

Q Please summarize your primary findings.

A My primary findings are as follows, discussed further in ensuing sections:

- Though there have been increases in solar penetration over the last few years, overall penetration of solar in WPL's service territory is still in the relatively early stages. Based on WPL's forecast, by the end of 2023 around 1 percent of residential customers will have installed a solar system,[2] and generation from these systems will be about 1.5 percent of annual load.[3]
  - Due to the relatively immature state of the solar market, cost shifts due to the NEM construct incurred by non-solar owning customers are small, around $0.00047 per kWh.[4]
- Despite significantly increased complexity relative to the NEM tariff, including a different underlying retail rate, additional compensation for exports, and hourly

[2] WPL estimates there will be 4,935 residential systems installed by the end of 2023 (*see* Ex.-CW-Borden-2) and there are 429,581 residential customers in WPL's service territory (*see* EIA form 861, 2022 early release, available at https://www.eia.gov/electricity/data/eia861/. This citation is not record evidence).
[3] WPL estimates there will be 33 megawatts (MW) of residential system capacity installed by the end of 2023 (*see* Ex.-CW-Borden-3). I estimate the generation from these facilities using utility generation assumptions per MW of capacity from Ex.-WPL-Cook-3r, tab "Hourly Model."
[4] See Section V for a description of this calculation.

netting, the Power Partnership proposal does not meaningfully improve the cost shift caused by NEM; it is effectively the same under both tariffs.

- Proposed performance incentive mechanisms (PIMs) are unjustified and seek to reward shareholders for basic utility activities and services, as well as developments in the solar market that are largely not influenced by the utility.
  - These returns will also serve to exacerbate cost shifts onto non-solar customers as solar distributed generation ("DG") penetration increases.

Q Please summarize your recommendations.

A The Power Partnership proposal should be rejected, and the current NEM tariff kept in place for customers who adopt solar. The Commission should also establish a process to transition to a successor tariff that considers multiple facets and tradeoffs of different compensation structures, including solar payback periods, cost shifts, and constructs that move away from entangling solar compensation levels with retail rate design. I discuss this in further detail in Section VII.

Q Please provide the structure of your testimony.

A Section III provides an overview of WPL's proposal, and compares this to the current NEM rate. Section IV discusses the policy landscape in Wisconsin related to distributed solar. Section V analyzes the impact of NEM on customers given current deployment levels of solar. Section VI analyzes the impacts of WPL's solar compensation "Power Partnership" proposal, and compares it with impacts caused by NEM. Section A provides a summary of my recommendations and conclusions based on the analysis presented in this testimony.

III. OVERVIEW OF WPL'S POWER PARNTERSHIP PROPOSAL

Q Why is the Company proposing to change the NEM rate?

A WPL has identified issues with continuing to rely on NEM, including cost shifts to non-participants. WPL states that the "current net metering framework does not create or ensure alignment between the actual power and financial flows."[5] Further, "[t]he appropriateness of the simplified transaction facilitated by net metering, […] is predicated on the proposition that all power has the same value regardless of when and how it is produced or consumed."[6] The Company notes that these simplistic structures are no longer tenable at growing rates of distributed PV adoption experienced since 2018, highlighting that at higher levels of penetration "these systems raise rates for other customers by artificially shrinking the denominator (kWh sales) in rate calculations."[7]

Q What rate structure does WPL propose for distributed solar and how does it differ from the current compensation mechanism?

A The current NEM rate (Parallel Generation, or PgS-3) is a fairly traditional NEM structure utilized by utilities across the country. All solar generation up to self-consumption in a month is credited at the Company's retail rate of about 16 cents per kilowatt hour (kWh); generation in excess of monthly load is credited at an avoided energy cost rate, which is "generally based on forecasted locational marginal prices ("LMPs")."[8]

WPL recommends eliminating the current rate and replacing it with a "Power Partnership" rate for all new customers with solar capacity less than 20kW. The proposal

[5] Direct-WPL-p-Cook-5.
[6] Direct-WPL-p-Cook-6.
[7] Direct-WPL-p-Cook-7.
[8] Direct-WPL-p-Cook-5.

is complex but is effectively a net billing rate with several additional charges and credits. Under the proposal, customers are enrolled in a time of day ("TOD") tariff wherein consumption or production is measured on a net hourly basis. For hours with net consumption (i.e., load is greater than solar generation), customers are charged the retail TOD rate. For hours of net generation (i.e., solar generation is greater than usage), customers are compensated with an energy cost credit (like the NEM energy credit), plus a "System Asset Value Credit" ("SAVC"), based on "the levelized capital cost of recent utility scale solar."[9] Additionally, the Company seeks to create a regulatory asset comprised of costs attributed to the SAVC, on which it would earn a return for shareholders.[10] A regulatory asset is an accounting mechanism that effectively allows expenses to be treated in the same manner as capital investments from an accounting perspective. Expenditures are depreciated over time and earn a return based on the utility's weighted average cost of capital (WACC) and capital structure.

The proposal also includes an Excess Use Distribution Charge ("EUDC") for hours of high net exports (greater than 5.2 kW), under the theory that these customers require higher investment "to operate and maintain the network."[11] Customers default on to the residential TOD retail rate but may opt in to the Company's residential demand rate. Table 1 provides the primary components of each rate structure for comparison purposes. For shorthand, this testimony refers to the current rate structure as "Current NEM," and the utility's proposal as "Power Partnership."

[9] Direct-WPL-Dorn-14.
[10] Direct-WPL-p-Cook-13.
[11] Direct-WPL-Cook-p-15.

Table 1: Summary of Rate Components – Current NEM versus Power Partnership

Category	Current NEM	Power Partnership
Consumption / Retail Rate	**Residential**	**Residential TOD**
Consumption Rate Code	Rg-1	Rg-5
Voltage Level	Secondary	Secondary
Charges		
Energy Consumption Charge ($/kWh)		
Applicability	Net monthly consumption	Net hourly consumption
High Rate	N/A	$0.260
Regular Rate	N/A	$0.192
Low Rate	N/A	$0.093
Average Rate	$0.157	N/A
Excess Usage Distribution Charge ($/kWh)		
Applicability	N/A	Net hourly exports for hours with >= 5.2kWh of net exports
Excess Usage Distribution Charge	N/A	$0.050
Fixed Charge ($/30 days)	$14.80	$14.80
Credits		
Excess Generation Credit ($/kWh)		
Applicability	Net monthly exports	Net hourly exports
High Rate	N/A	$0.071
Regular Rate	N/A	$0.049
Low Rate	N/A	$0.040
Average Rate	$0.046	N/A
System Asset Value Credit ($/kWh)		
Applicability	N/A	Net hourly exports
System Asset Value Credit	N/A	$0.064

Q Why does the Company state a return on the System Asset Value Credit is reasonable?

A The Company states that DG customers benefit from WPL's management of the distribution system, provision of additional hosting capacity when necessary, interconnection issues, "back-up grid services to account for intermittency of DG," and other activities of the utility.[12]

[12] Direct-WPL-p-Cook-13-14.

IV. THE POLICY LANDSCAPE IN WISCONSIN SUPPORTS DISTRIBUTED SOLAR

Q Please describe the relevant policy landscape in Wisconsin related to renewable energy deployment.

A Governor Evers' Executive Order 38 sets a goal of 100 percent carbon-free electricity by 2050, as well as attainment of carbon reduction goals set forth in the 2015 Paris Climate Accord and promoting clean energy workforce training.[13] Furthermore, Alliant Energy, WPL's parent company (which has operations in Iowa and Wisconsin) seeks to reduce emissions of its businesses in the coming years to achieve net zero emissions by 2050.[14] Though these goals can be met with a range of generation technologies and investment approaches, fostering distributed solar deployment in a cost-effective manner is a necessary and viable option to help achieve these goals.

Q How can distributed solar help meet the state's clean energy policy goals?

A A study by Cadmus found that the technical potential of solar in Wisconsin is large: "[r]ooftop solar PV systems represent a sizable energy resource in terms of technical potential capacity; approaching 70% of statewide 2019 generation by 2034."[15] A report modeling several potential pathways to 100 percent clean energy found a role for distributed solar in each scenario:

[13] Ex.-CW-Borden-4.
[14] Ex.-CW-Borden-5.
[15] Ex.-CW-Borden-6.

"Distributed energy resources (DER), including rooftop solar and flexible loads are deployed in all scenarios. These can reduce the pace and scale of grid-scale resource investment, taking the pressure off potentially challenging rates of deployment and giving Wisconsin more options to achieve clean electricity and net zero emissions targets."[16]

Q How does this policy landscape inform your testimony?

A Ensuring a healthy distributed solar market is important for Wisconsin to meet its clean energy targets. My testimony seeks to ensure the market becomes established in WPL's service territory while also considering impacts on all ratepayers, including non-solar owners.

V. DISTRIBUTED SOLAR PENETRATION IN WPL'S SERVICE TERRITORY IS AT AN EARLY STAGE

Q Where is WPL in terms of its stage of solar PV adoption?

A WPL is in a relatively early stage of adoption, although solar adoption is far enough along that the Commission should begin to consider changes to the NEM construct which balance adequate compensation for solar deployment with minimizing non-solar ratepayers' cost burden (Section VI). Around 1 percent of residential customers will own or lease solar in WPL's service territory through the end of 2023;[17] generation from these facilities is about 1.5 percent of annual total load.[18] Thus, around 99 percent of customers in WPL's service territory have not adopted solar to date.

[16] Ex.-CW-Borden-7.

[17] WPL estimates there will be 4,935 residential systems installed by the end of 2023 (*see* Ex.-CW-Borden-2) and there are 429,581 residential customers in WPL's service territory (see EIA form 861, 2022 early release. This citation is not record evidence).

[18] WPL estimates there will be 33 megawatts (MW) of residential system capacity installed by the end of 2023 (*see* Ex.-CW-Borden-3). I estimate the generation from these facilities using utility generation assumptions per MW of capacity from Ex.-WPL-Cook-3r: tab "Hourly Model."

By contrast, 20 percent of residential customers in Hawaii have solar distributed generation, followed by California at 10 percent.[19] Deployment of solar in WPL's service territory is an order of magnitude smaller than states with high levels of adoption. Although WPL is correct in that distribution PV adoption is increasing in its territory, it is still in a relatively early stage of adoption.[20]

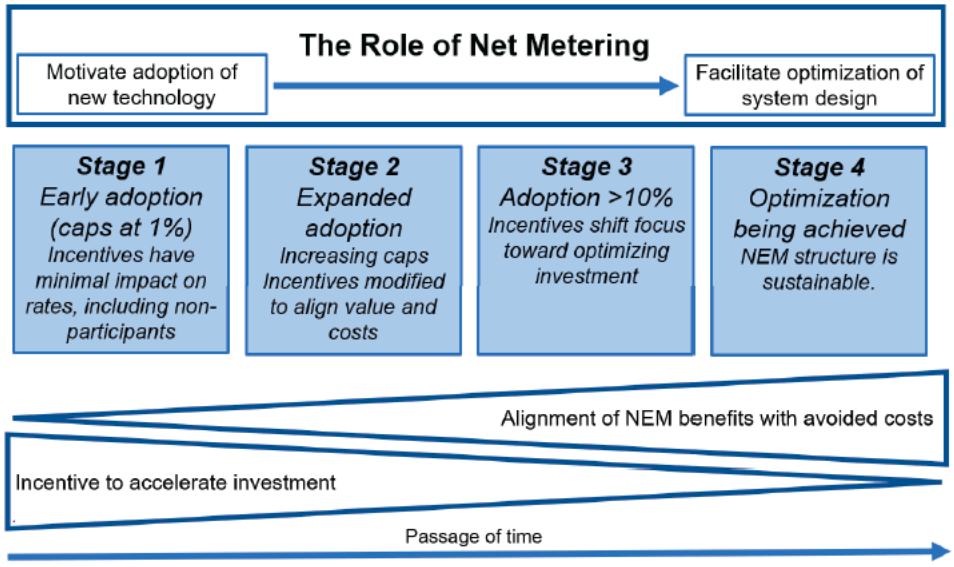
Q Why is this important for the Commission's considerations in revising NEM compensation mechanisms for distributed solar?

A While WPL is correct to point out shortcomings of the NEM construct for solar compensation, these do not need to be addressed in the early stages of market deployment because the impact on non-participating customers is small and the focus should be on deployment of the technology. The NEM construct, for all of its faults at higher levels of deployment, is a very simple and easy-to-understand way of compensating distributed solar resources and usually results in relatively high levels of compensation that may be appropriate to incentivize early adoption.

Based on a framework developed by the National Academies of Sciences (NAS) shown below, WPL is around the end of the introductory "Phase 1" in its solar DG adoption evolution. As adoption increases, compensation levels should move towards avoided costs, while also considering the cost to install solar. This minimizes the cost shift to non-solar customers while reducing subsidy levels compared to the NEM compensation construct. Below, I address why the utility's Power Partnership proposal fails to address the downsides of the current NEM construct and may ultimately exacerbate them.

[19] Ex.-CW-Borden-2: 48.
[20] Direct-WPL-p-Cook-8.

Figure 1. Illustrative Evolution of Net Metering for Solar Compensation



Source: Ex.-CW-Borden-2:12.

At current levels of deployment, any "cost shifts" due to NEM are small

Q Please explain WPL's argument that Net Energy Metering can cause a "cost shift" from solar customers to customers who have not installed solar.

A NEM rates can shift costs to non-participants due to two primary reasons: inappropriate compensation levels for solar generation and reduced sales which result in lost revenues to the utility. First, as WPL describes,[21] NEM compensation is based on compensation for solar generation at the retail rate which does not reflect its value to the grid. In economic terms, distributed resources avoid certain future marginal costs (namely energy and capacity costs). By contrast, the retail NEM rate includes costs that cannot be avoided, namely historic or embedded costs. The difference between the marginal costs that can be avoided by distributed resources and embedded costs in retail rates results in

[21] Direct-WPL-Cook-p-8-9.

costs that are shifted to non-solar customers, depending on the rate or compensation structure in place.[22]

Second, since solar generation is netted against energy consumption, energy sales decline with NEM participation, resulting in lost revenue to the utility. As WPL describes,

> "NEM results in sales that only appear low from a metering and billing perspective. To be sure, some of the generated electricity will be consumed immediately on-site, thus lowering the amount supplied by the utility. However, allowing a meter to "spin backwards" and simply net out production versus consumption over the course of an entire billing month reduces the sales volumes in a way that does not reflect the actual amount consumed by the customer."[23]

Put another way, WPL argues that as solar DG increases in penetration under NEM, the fixed costs included in utility revenue requirements that were previously paid by all customers may increasingly be shifted to non-solar customers.

Q Even if one accepts WPL's argument that there is a "cost shift," are the issues you describe above currently a concern under the NEM rate?

A My analysis shows that the NEM cost shift to non-solar customers is relatively small through at least the end of the year, and will likely continue to be small over the next few years. I estimate that at current deployment levels of residential solar through the end of 2023 in WPL's service territory (4,935 systems based on the utility's estimate),[24] average non-solar customers pay an extra $0.00047 per kWh (assuming a solar size of 7.07kW).[25]

[22] If avoided costs of solar generation are greater than the retail rate at a certain time then a cost shift would occur from non-solar customers to solar customers. In this instance the solar customer would provide value to the grid above their compensation.
[23] Direct-WPL-Cook-p-8.
[24] Ex.-CW-Borden-3.
[25] Assuming a solar system size of 5.36kW, the average non-solar customer would pay an additional $0.00084/kWh, or an additional $0.57 per month.

This means the average customer pays an extra 32 cents per month, which is 0.26 percent of the current average monthly bill. Even by 2025, when WPL forecasts total deployment of solar DG will reach around 8,600 systems,[26] the cost shift from NEM will only amount to approximately $0.00083 per kWh, or an extra 56 cents per month for the average non-solar residential customer.[27]

Q How did you calculate the cost shift currently imposed on non-solar customers described above?

A Relying on WPL's Witness Cooks' workpapers and calculations, I estimated lost revenues from NEM by subtracting the average NEM bill (assuming a solar size of 7.07kW) from the average residential bill without a solar system.[28] I multiplied this by 4,935, WPL's estimate of the number of residential customers who will have solar DG by the end of 2023, to determine the total lost revenues.[29] I then subtracted the benefits (avoided costs)[30] from the lost revenue, which provides an estimate of total utility costs associated with NEM. I then divided by residential sales to determine the total rate impact.[31] Table 2 below shows the estimated end of year 2023 cost shift under NEM in dollar terms.

[26] Based on Ex.-CW-Borden-3.
[27] Assuming a solar system size of 7.07kW. When assuming an average solar system size of 5.36kW, the rate impact is $0.0015 per kWh, or an additional $1.00 per month.
[28] Based on data from Ex.-WPL-Cook-3r.
[29] Ex.-CW-Borden-3.
[30] See below for description of avoided cost calculations.
[31] Additionally, when conducting this calculation for Power Partnership customers, I added the difference in net-consumption between Power Partnership and Current NEM to compensate for the fact that total load will increase under Power Partnership, due to less netting of consumption at the retail rate (hourly vs. monthly). Residential class sales data from WPL response to 2-CW-5&6-2022 (Ex.-CW-Borden-8).

Table 2: Estimated Annual Cost Shift from Solar to Non-Solar Customers

	Lost Revenue ($)	Avoided Cost ($)	Cost Shift ($)
Current NEM	$6,751,207	$5,190,136	$1,561,071

Q Please describe how you estimated avoided costs due to solar PV generation.

I used the avoided energy and capacity costs from Cadmus' Focus on Energy Calendar Year 2022 Evaluation Report, which was prepared for the Public Service Commission of Wisconsin to evaluate Demand-Side Management (DSM) programs. Values are shown in Table 3.[32]

Table 3. Avoided Energy and Capacity Values

Avoided Value	Unit	Low	Mid	High
Avoided Energy	$/kWh	$ 0.031	$ 0.043	$ 0.054
Avoided Capacity	$/kW-y	$ 131.38	$ 157.03	$ 182.67

Source: Cadmus, Apex Analytics, and Resource Innovations. May 22, 2023. Focus on Energy Calendar Year 2022 Evaluation Report, Volume III, at I-15 to I-16. Prepared for the Public Service Commission of Wisconsin. The mid-point (average of high and low estimates) is calculated by Synapse and used in our analysis.

To calculate the annual avoided energy costs, I multiplied the annual total gross energy produced by a 7.07 kW system[33] and multiplied it by the avoided energy value (using the mid-point between the high and low estimates shown above). Avoided capacity costs are based on peak demand savings, or the average solar energy produced (and therefore avoided by the utility) during a system's peak period.[34] I multiplied the avoided capacity

[32] Avoided energy costs are based on forecasted MISO locational marginal prices ("LMPs") averages across Wisconsin nodes. Avoided capacity costs are based on the unit cost of a peaking plant, using MISO-established Cost of New Entry ("CONE") values as well as MISO Narrow Constrained Area net revenues (*see* Ex.-CW-Borden-9).

[33] Solar PV energy production for the average installed system was provided in Ex.-WPL-Cook-3r. I also estimated annual avoided energy costs for systems sized at 5.36kW.

[34] I could not find specific guidance regarding avoided capacity costs in the documents provided by WPL. I therefore used the Department of Energy's National Renewable Energy Laboratory (NREL) protocols for determining energy and demand savings of energy-efficiency measures implemented through state and utility programs. *See* Stern, F.; Spencer, J. (2017). Chapter 10: Peak Demand and Time-Differentiated Energy Savings

mid-point value by the average solar generation (i.e., reduction in demand)[35] during the system peak hour.[36] Once avoided energy and capacity costs per system were determined, I then multiplied those costs by 4,935, the expected number of residential PV systems to be installed by the end of 2023 based on WPL's forecast,[37] to estimate the total avoided costs of residential solar DG deployed through the end of 2023.

Although the Focus on Energy report includes avoided transmission and distribution ("T&D") costs for the evaluation of some DSM programs, the authors of the report advise specifically against applying these values for renewable energy projects.[38] While I believe a reasonable estimate of avoided T&D costs should be included, I omit this for consistency with Wisconsin's approach to evaluation of demand-side programs.

Q Please summarize your conclusions from the preceding analysis.

A WPL's service territory is in a relatively early stage of solar DG deployment. Cost burdens on non-solar customers due to NEM compensation will remain fairly low through the end of the year, and even for the next few years.

Cross-Cutting Protocol. The Uniform Methods Project: Methods for Determining Energy-Efficiency Savings for Specific Measures, at 2. Golden, CO; National Renewable Energy Laboratory (provided as Ex.-CW-Borden-10).

[35] Based on the energy production values provided in Ex.-WPL-Cook-3r.

[36] MISO Zone 2's annual peak hour was determined using U.S. Energy Information Administration (EIA) form 930, for years 2019-2022 (this citation is not record evidence). In recent years, the peak has occurred in June or July between the hours ending 14 to 17. I used the average solar generation for hour ending 16 (average of 2019-2022 peak hours) in June and July, multiplied by the mid-point avoided capacity value, to estimate the annual peak demand avoided cost. I estimated annual avoided capacity costs for systems sized at 7.07kW and 5.36kW

[37] Ex.-CW-Borden-3.

[38] The report states "avoided T&D costs are not applied to renewable projects at this time as insufficient primary data currently exist to verify any net reduction in T&D needs that would be associated with installing local generation, such as through photovoltaics (PVs)." Ex.-CW-Borden-9: I-17.

VI. WPL'S "POWER PARTNERSHIP" PROPOSAL DOES NOT SUBSTANTIVELY ADDRESS A LONG-TERM SOLUTION FOR NET ENERGY METERING COMPENSATION

Q How much does compensation differ between the current NEM structure and the proposed Power Partnership construct?

A Ultimately, total compensation under the two structures is very similar, despite the significantly more complex Power Partnership construct described above. An average usage customer who installs a 7.07 kW solar system[39] receives 12.7 cents per kWh in compensation under the traditional NEM structure, while the average customer participating under the proposed Power Partnership compensation mechanism will receive 12.9 cents per kWh.[40]

However, I note that WPL's calculations oversize the solar DG system relative to load. A system more realistically sized closer to average annual load is around 5.36 kW. Assuming solar capacity of 5.36kW and average load results in higher compensation under the NEM rate versus the Power Partnership proposal – 14.4 cents per kWh versus 13.8 cents per kWh, respectively. Regardless, the difference in compensation between the current NEM tariff and Power Partnership rate is small if one assumes that all retail rates, buyback rates, and utility-proposed charges remain constant.

[39] WPL calculated bill savings using an assumed nameplate capacity for solar of 7.07 kW_{AC}, based on the average size of solar installed to-date. However, the load profile for the solar customer is based on an "average residential customer." When comparing the two, generation from the system significantly exceeds load (indicating current NEM customers have higher than average load). A customer signing up for NEM is likely to attempt to match annual load with annual consumption, given that excess generation is credited at a much lower rate, which increases the payback time for that customer. Annual production of a 5.36 kW_{AC} system (based on the Company's PV Watts workpaper) is 8,142 kWh, nearly matching the total load of an average customer used by WPL in its hourly load profile (Ex.-WPL-Cook-3r).

[40] Calculated from Ex.-WPL-Cook-3r.

The similarity in compensation levels between the two rates is also demonstrated by WPL's calculation of payback periods, which are virtually the same under the proposals – 12.3 years for the NEM tariff versus 12.2 years under Power Partnership (assuming a 7.07 kW system).[41] (See Table 4.) A smaller system that more closely matches the average customer's annual load (5.36 kW) provides a 10.8 year payback under the current NEM rate and 11.2 years for Power Partnership.[42] (See Table 5.) Once again, it is important to note that WPL assumed that all rates remain constant through the entire payback period analysis by applying first-year bill savings to all future years. It is difficult to predict values in future years, especially the credits and charges as proposed by WPL in its Power Partnership tariff.

Table 4. Bill Savings and Payback Periods for a 7.07kW System for Current NEM and Power Partnership Proposal

	Baseline Total Bill No Solar (Annual)	Total Bill (Annual)	Bill Savings (Annual)	Payback Period (Years)
Current NEM	$1,459	$91	$1,368	12.30
Power Partnership	$1,459	$76	$1,383	12.16

Table 5. Bill Savings and Payback Periods for a 5.36kW System for Current NEM and Power Partnership Proposal

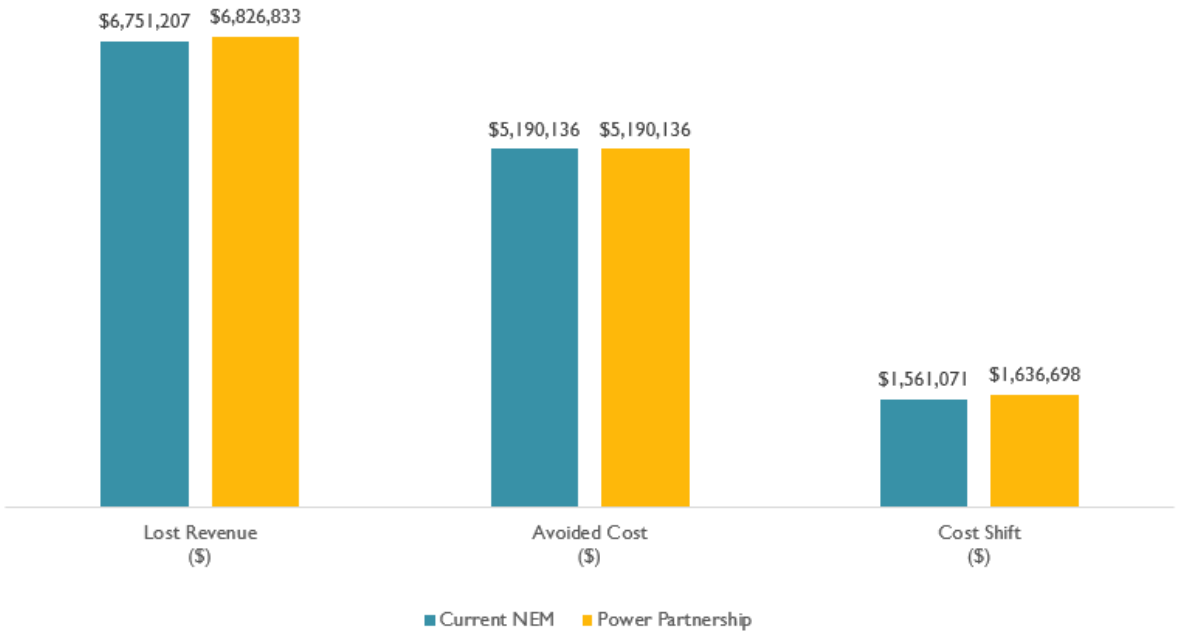
	Baseline Total Bill No Solar (Annual)	Total Bill (Annual)	Bill Savings (Annual)	Payback Period (Years)
Current NEM	$1,459	$285	$1,174	10.76
Power Partnership	$1,459	$332	$1,127	11.21

[41] Calculated from Ex. WPL-Cook-3r and Ex.-WPL-Cook-8r.
[42] Calculated from Ex. WPL-Cook-3r and Ex.-WPL-Cook-8r.

Q Does the Power Partnership rate substantially address the cost shift issue relative to the current NEM structure?

A It does not. Using the methodology described above, I calculated the cost shift under the current NEM rate and the Power Partnership proposal for 4,935 systems (the number of systems forecast by WPL to be installed through the end of 2023). The cost shift under these rates are virtually identical and are slightly more for the Power Partnership proposal based on the utility's assumptions.[43]

Figure 2. Cost Shift to Non-Solar Customers through 2023



This does not include the cumulative effects of WPL's regulatory asset and PIM proposals, discussed further below.

[43] This primarily includes a 7.07kW solar system, average load profile, and modeling of rates in Ex. WPL-Cook-3r.

Q What are your conclusions based on the preceding analysis?

A WPL's Power Partnership proposal does not solve the cost shifting issues caused by NEM; it results in a similar level of compensation despite significantly increased complexity including netting period, retail rate, and export values.

Shareholder Incentives Proposed by WPL are Unnecessary, Unjustified, and Will Exacerbate Cost Shift Issues Over the Long-Run

Q What shareholder incentives does the Company propose?

A The Company proposes two types of shareholder incentives. First, the SAVC will be treated as a regulatory asset and earn a return. Second, WPL proposes a PIM by which it would earn a higher return on equity on the SAVC regulatory asset if the territory achieves greater than linear growth for solar adoption from 2023–2025.[44] I will discuss my concerns with each of these incentive mechanisms in turn.

System Asset Value Credit

Q Is regulatory asset treatment of the SAVC reasonable?

A No. The utility's rationale for earning a return on this value is that DG customers "benefit from having the distribution system available," as well as services provided by the utility for interconnection, hosting capacity, and grid services.[45] What WPL describes as requiring additional compensation for its shareholders *are the activities for which the utility has been granted a monopoly*. The utility's monopoly purview includes all of the activities listed, and no "extra" return should be required for the utility to perform them. In my view, WPL is simultaneously taking for granted the extraordinary privilege it has been afforded through its state-granted monopoly status, while downplaying the

[44] Direct-WPL-Cook-p-14.
[45] Direct-WPL-Cook-p-13-14.

extraordinary responsibility this privilege comes with to provide safe, affordable, and reliable energy service to all customers, including solar DG owners. If capital investments do need to be made to increase hosting capacity of circuits as solar PV penetration increases, for example, utility shareholders *will* earn a return on these investments. I fail to see why the requested remedy is necessary or in the ratepayer's interest. The traditional regulatory compact is not somehow broken when customers install demand-side resources, as they have done for decades.

Q How does regulatory asset treatment of the SAVC impact ratepayers?

A As distributed solar PV adoption increases, the additional return earned by the Company will accumulate and further exacerbate the cost shift issue discussed above. I estimate annual impacts based on WPL's current estimate of the SAVC in Table 6 below, assuming a 10 percent return on equity and the utility's current capital structure. The estimates in Table 6 reflect just the carrying costs (return on debt and equity) of the regulatory asset treatment of the SAVC proposed by WPL, not including the PIM proposal discussed below.

Table 6. Cost Impact of Regulatory Asset Treatment

Systems	Solar DG as Percent of Load (%)	Solar DG Capacity (MW)	Annual Ratepayer Costs Due to SAVC Reg Asset ($)
5,000	2%	35	$219,573
15,000	5%	106	$658,719
30,000	10%	212	$1,317,437
48,000	15%	339	$2,107,900
62,000	20%	438	$2,722,704

Source: Estimated based on WPL Response to1-CW-3, Cook Workpaper 2 (PSC Ref. # 473361). I calculate the cents per kWh for return on equity, debt, and taxes, based on the tab, "Cost of Capital" and the Company's estimate for the SAVC charge, 6.4 cents per kWh (tab "Exhibit 4").

These costs would be paid annually and continue to increase and accumulate as solar PV DG penetration increases. This will exacerbate the cost shift issue as non-solar sales shrink and these costs increase.

Performance Incentive Mechanism

Q Please describe the utility's proposal for a PIM related to distributed solar adoption.

A WPL proposes to earn additional return on equity ("ROE") for shareholders for the SAVC described above, on top of the currently authorized 10 percent. Proposed ROE adders range from 0.5 percent to 2 percent, based on the increase in solar PV penetration "relative to the baseline of the linearly forecasted increase in interconnected facilities over the three most recent years."[46] If solar PV installs increase above the linear forecast, so does the ROE adder.

Q Why does WPL state these additional earnings are reasonable?

A WPL states "[t]his additional 2 percent of return potential further aligns incentives among the utility, customers, and Wisconsin's State energy policy. It does this by providing an incentive for WPL to facilitate the interconnection of new, renewable, customer-owned generation."[47]

Q Do you believe this justification is reasonable?

A For similar reasons as described above regarding regulatory asset treatment of the SAVC, I do not agree that WPL should be authorized additional return for simply performing one of its duties as a utility—interconnecting solar DG. Further, this performance incentive mechanism is poorly designed, namely because the amount of solar PV penetration is

[46] Direct-WPL-Cook-p-14.
[47] Direct-WPL-Cook-p-15.

outside the direct control of the utility: the amount of solar penetration is more related to the cost of solar and compensation mechanisms adopted by the Commission. As has been previously discussed in Wisconsin, a reasonable design principle for a PIM is that it be "focused on results that are subject to utility influence."[48] The costs of solar, state, and federal incentives and tax credits, the economic environment, and other factors that primarily influence distributed solar DG adoption are not influenced by the utility. Furthermore, since the forecast is based on a linear increase relative to the prior three years while customer installations are increasing exponentially, the company may exceed the forecast by simply maintaining growth at its recent growth rate.

Q Do you therefore oppose all types of PIMs, which can include earnings for shareholders that may not be consistent with traditional ratemaking?

A I do not. However, such mechanisms should be carefully designed to align the incentives of utility shareholders and the public interest, and not to simply enrich shareholders.

Q Please summarize your conclusions based on the analysis of WPL's proposed PIMs.

A Costs related to the utility's proposal for return on compensation given to solar customers are compounded by the additional shareholder return if higher solar adoption than forecast occurs in WPL's service territory. While I do not oppose PIMs *per se,* I do not believe these proposals are in the interest of ratepayers or the solar market.

VII. SUMMARY OF RECOMMENDATIONS AND CONCLUSIONS

Q Please summarize your recommendations.

A I recommend the Commission reject WPL's proposal to transition from the current NEM tariff to a Power Partnership tariff. The current NEM tariff should stay in place at this

[48] Ex-CW-Borden-11.

time for solar customers, given that WPL is in a fairly early stage of solar adoption. As such, any impact on non-solar customers is relatively small and the benefits of establishing a distributed solar market tend to outweigh any negative impacts of NEM at this stage. Further, my analysis shows that the Power Partnership proposal results in effectively the same negative impacts as NEM and may be worse for ratepayers in the long-run due to the proposal for excess returns that are unjustified and unnecessary. That said, I agree that as the solar market matures in WPL's service territory the NEM tariff will likely no longer be a suitable compensation mechanism. I therefore recommend the Commission put a process in place to consider successor tariffs or compensation structure to replace NEM for new solar customers as solar penetration increases. While I do not opine here on the exact NEM successor mechanism that the Commission should adopt, I recommend the Commission consider the following issues in successor program design to balance the need for a healthy and robust solar DG market with the consideration of the impacts on ratepayers who cannot or do not adopt solar. These include:

- Payback period and likely adoption rates given the level of compensation offered, solar installation cost, and availability of tax credits and other incentives for solar adopters;
- Cost increases borne by non-solar customers;
- How to change solar compensation over time, including automatic changes or consideration by the Commission based on percentage of annual load generated by solar systems, total customers with solar, or other metrics.
- Compensation constructs outside of retail rates that may be more suitable to administrative changes and eliminate the need to design retail rate tariffs with solar customers in mind. This includes "buy-all/sell-all" rates, value of solar tariffs, and feed-in tariffs.[49]

I recommend exploration of solar compensation mechanisms that are not based on customer rates because the value of solar generation is distinct from rates. As discussed above, rates must recover both marginal and embedded costs while solar (or any demand-side resource) can only avoid marginal costs.

In sum, while I agree with some of the utility's concerns about NEM as the solar market matures, solutions do not need to be implemented immediately while penetration rates remain low in WPL's service territory. Further, the Power Partnership proposal fails to substantially address a long-term solution for NEM and should be rejected.

Q Does this conclude your testimony?

A Yes, it does.

[49] Ex.-CW-Borden-2: 14-26.