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BEFORE THE PUBLIC SERVICE COMMISSION OF UTAH

IN THE MATTER OF THE APPLICATION OF ROCKY MOUNTAIN POWER TO ESTABLISH EXPORT CREDITS FOR CUSTOMER GENERATED ELECTRICITY	**DOCKET NO. 17-035-61**

REBUTTAL TESTIMONY OF KATE BOWMAN

ON BEHALF OF

UTAH CLEAN ENERGY

JULY 15, 2020

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I. INTRODUCTION AND QUALIFICATIONS

Q. Please state your name, title, and employer.

A. My name is Kate Bowman. I am the Renewable Energy Program Coordinator for Utah Clean Energy.

Q. Are you the same Kate Bowman that provided direct testimony in this Docket on March 3, 2020?

A. Yes.

Q. What is the purpose of your rebuttal testimony?

A. The purpose of my rebuttal testimony is to respond to direct testimony filed by other parties, particularly the direct testimonies of Rocky Mountain Power ("the Company"), the Division of Public Utilities ("the Division"), and Vote Solar. In Section II of my rebuttal testimony I provide an overview of my findings and recommendations. In Section III I respond to evidence presented by Rocky Mountain Power, the Division of Public Utilities, Vote Solar, and Vivint Solar regarding the categories of cost and benefit that should be considered in the development of the Export Credit. I also respond to methodologies that parties have presented to quantify the value of costs and benefits. In Section IV, I respond to rate design elements of Rocky Mountain Power's proposed Net Billing Program and I present an alternative proposal for a just and reasonable rate design for the Export Credit.

II. SUMMARY OF FINDINGS AND RECOMMENDATIONS

Q. Please summarize the main findings of your rebuttal testimony and your recommendations.

A. The Export Credit rate determined through this proceeding will have profound impacts on the future market for rooftop solar and other distributed energy resources in Utah. A fair value is necessary in order for Utah ratepayers to ultimately realize the benefits of private investments in distributed energy resources. I have reviewed the proposals of other parties to evaluate whether they appropriately consider the costs and benefits of distributed energy exports and will result in an Export Credit value that is just and reasonable and furthers the well-being of Utah. I have also reviewed rate design proposals presented by other parties in order to evaluate whether their proposals will result in a just and reasonable Export Credit rate – namely, whether they are simple and comprehensible to customers, employ gradualism if necessary to mitigate severe economic impacts, and provide solar customers with sufficient certainty about their future rates. As described in my direct testimony, these considerations are critical to the determination of an Export Credit rate that allows Utah customers to realize the benefits of distributed energy resources, including improved grid flexibility and resiliency, that will keep grid costs low in the long run. Silence on other elements of parties' direct testimony does not indicate my agreement or support, nor does it reflect opposition. I reserve the right to respond additionally in surrebuttal testimony.

I provide the following recommendations related to the value of the Export Credit:

- I recommend that the Commission reject the Company's proposed Export Credit value because it does not address many of the quantifiable benefits of exported distributed energy.
- Avoided energy costs should be determined using hourly forward-looking projections of energy costs and data that is accessible to stakeholders, and not GRID. I support Vote Solar's proposed value for avoided energy costs.

- I recommend that the Commission include a value for the capacity benefits of aggregated distributed solar exports in the Export Credit, and I support the values proposed by Vote Solar and Vivint Solar.
- The Commission should not limit evaluation of the Export Credit value to the factors considered in the Proxy/PDDRR methodology, which is designed for QFs and does not account for the benefits of distributed energy resources.
- The issue of grid impacts from distributed energy resources and opportunities to maximize the benefits of these resources should be explored through a transparent Integrated Distribution System Planning process.
- I recommend that the Commission create placeholders for grid support services and for reliability and resilience so that these benefits can be quantified in the future.
- The Export Credit should include the benefits of carbon-free resources, including carbon compliance costs, avoided health impacts, and the societal benefits of reduced carbon emissions. I support Vote Solar's proposed values for these benefits.

Next, I provide the following recommendations regarding the rate design for the Export Credit:

- Solar customers should remain on the Export Credit value current on their date of interconnection approval for 20 years.
- I recommend that the Transition Program rate be maintained until the Transition Program Cap has been reached.
- The Export Credit rate should not be netted more frequently than hourly in order to ensure that it is comprehensible and actionable.

Based on the evidence of the significant benefits provided by distributed solar exports, I do not oppose a return to net metering, as proposed by Vote Solar. Should the Commission approve a value for the Export Credit that is less than the Transition Program value, I present a proposal for achieving a gradual transition to a lower Export Credit rate. This proposal is informed by rate design recommendations I have described and the evidence of the significant benefits from exported distributed energy, and will mitigate uncertainty and risk that will deter investments in distributed solar and result in severe economic impacts.

III. VALUE OF THE EXPORT CREDIT

A) Response to Rocky Mountain Power's Direct Testimony

Q. What is Rocky Mountain Power's proposal for the Export Credit?

A. Rocky Mountain Power recommends a Net Billing Program based on an average annual Export Credit value of $15.26 per megawatt-hour for calendar year 2021, differentiated by on-peak and off-peak periods in addition to summer and winter periods.

Q. Please summarize your response to Rocky Mountain Power's proposal.

A. The Company's proposed Net Billing Program does not result in a fair compensation rate for exported distributed solar energy. First, the Company's proposed Export Credit value includes only avoided energy costs, avoided line losses, and integration costs. The Company's proposed value omits consideration of widely acknowledged benefits from exported solar energy, including capacity value, ancillary services, market price suppression, fuel price hedging, environmental benefits, reliability and resiliency, and economic development. Legislative and statutory guidance and the Settlement Stipulation in Docket No. 14-035-114 ("Settlement Stipulation") are clear that the Commission may consider any of these benefits when evaluating solar energy exports. I recommend the Commission reject the Company's proposed Export Credit value because it does not address many of the quantifiable benefits of distributed energy exports.

Next, I outline several issues with the Company's proposal to evaluate avoided energy costs using the Partial Displacement Revenue Requirement ("PDDRR") methodology and the GRID model. The GRID model is not sufficiently granular to capture the value of small distributed energy resources, and the Company states that hourly outputs from GRID are confidential and cannot be used to develop the Export Credit value. To correct this shortcoming, the Company proposes to 'shape' monthly average outputs from GRID based on historical prices. This fix is overly complicated, further obscures pricing, and is not likely to reflect future energy costs. Given the weaknesses of the GRID model, and the Company's plans to retire it in 2022, I recommend against using it to determine avoided energy costs. Instead, I recommend that avoided energy costs are determined using hourly forward-looking projections of energy costs and data that is accessible to stakeholders.

Third, I address the Company's proposal to omit capacity credit from the Export Credit value. The Company claims that distributed solar does not defer future capacity resources because it provides non-firm power. However, distributed solar installations are geographically diverse, and aggregate energy exports from distributed energy resources are predictable and defer future capacity investments. This is apparent in the Company's Integrated Resource Plan, which models distributed solar as a decrement to load that reduces system peak, and therefore future capacity needs.

I conclude that the Company's proposal undervalues distributed solar exports, which will discourage solar customers from installing distributed solar. If approved, those who do choose to invest in solar will respond to the strong price signal to store their generation, rather than export it to the grid, denying non-solar customers the benefits that distributed energy resources provide to the grid.

<u>The Company's proposed Export Credit value omits consideration of widely acknowledged and quantifiable benefits from exported solar energy.</u>

Q. Is there a standard methodology for determining the value of the costs and benefits of exported solar energy?

A. No. However, many states, utilities, and industry groups have conducted evaluations of the costs and benefits of exported solar energy. Several meta-analyses of these evaluations have identified a core set of costs and benefits that should be considered when determining an accurate value of exported distributes solar energy.

Q. Please describe some of the key meta-analysis studies and reports on valuing distributed energy.

A. The National Association of Regulatory Utility Commissioners' ("NARUC") *Manual on Distributed Energy Resources Rate Design and Compensation* is intended to assist Commissions in considering rate design and compensation policies for distributed energy resources and includes a discussion of valuation methodologies for distributed energy resources (Exhibit A, p 133 - 134). The Interstate Renewable Energy Council's ("IREC") 2013 publication *A Regulator's Guidebook: Calculating the Benefits and Costs of Distributed Solar Generation* contends that a standardized methodology for evaluating distributed solar generation benefits and costs is necessary to help legislators and regulators evaluate distributed solar policies (Exhibit B). To that end, IREC provides recommendations regarding best practices for calculating various benefits and costs. The Rocky Mountain Institute's ("RMI") 2013 publication *A Review of Solar PV*

Benefit & Cost Studies identifies the range of costs and benefits that have been considered in evaluations of the value of distributed solar energy, and discuses methodological differences in early cost-benefit evaluations (Exhibit C). A 2019 publication from the National Renewable Energy Laboratory ("NREL") identified factors that have been considered in state-level distributed solar cost-benefit valuations in response to a request from the Oklahoma Office of the Secretary of Energy and Environment (Exhibit D). Each of these analyses finds that methodologies for calculating the value of distributed solar energy vary depending on local context, policy goals, and program design. However, taken together, they provide a foundational framework for identifying the categories of cost and benefit that are attributable to distributed solar energy.

Q. Please describe the categories of cost and benefit that are identified and described in these four analyses.

A. These four analyses generally address twelve categories of cost and benefit:

- Energy
- Transmission & distribution loss savings
- Capacity (including generation, transmission, and distribution capacity)
- Ancillary services (or grid support services)
- Fuel price hedging
- Market price suppression
- Integration costs
- Reliability and resiliency
- Economic development
- Carbon compliance costs
- Avoided air pollution
- Other environmental factors

Figure 1 provides additional detail illustrating the categories of cost and benefit addressed in each valuation study.

Figure 1. Comparison of Cost and Benefit Categories Addressed in Distributed Energy Valuation Reports

Category	Report			
	NARUC, Exhibit A	IREC, Exhibit B	RMI, Exhibit C	NREL, Exhibit D
Energy	●	●	●	●
Line loss savings	●	●	●	●
Capacity	●	●	●	●
Ancillary services (grid support services)	●	●	●	●
Fuel price hedging	●	●	●	●
Market price suppression		●	●	●
Integration costs	●	●	●	●
Reliability and resiliency	●	●	●	*
Economic development		●	●	*
Carbon compliance	●	●	●	●
Air pollution	●	●	●	●
Other environmental factors	●	●	●	●

**NREL notes that "Other studies have included additional factors… such as economic development, disaster recovery, and fuel-supply and other security risks," but does not discuss these categories in detail.*

Q. How do you recommend that the Commission consider categories of benefits and future benefits are challenging to capture in rate design?

A. It is appropriate to consider benefits that are challenging to capture in rate design. NARUC's *Manual on Distributed Energy Resources Rate Design and Compensation* provides guidance regarding consideration of benefits that can be quantified, but are not traditionally accounted for in rate design: "If a jurisdiction identifies additional benefits, such as job creation, it should be considered outside the development of the rate itself and can be treated as an adder or compensated for in some other manner."[1] As explained in NARUC's *Manual on Distributed Energy Resources Rate Design and Compensation*, rate design "is often said to be more art than science," and "many of the goals and principles [of rate design] conflict with one another, and it is the job of the regulator to weigh these principles and goals and approve a rate design that best reflects the public interest as the regulator sees it."[2] The Settlement Stipulation gives the Commission broad discretion to consider both straightforward categories of cost and benefit (like energy value, generation capacity, and line losses) in addition to "other considerations" (for example, appropriate netting intervals) when determining a fair Export Credit value (Settlement Stipulation, paragraph 30).

Q. Does the Company's proposal adequately address the breadth of categories of cost and benefit of distributed solar that can be considered?

A. No, of the ten categories identified above, the Company's proposal only addresses energy, line loss savings, and integration costs. The Company's proposal does not address capacity, ancillary services, fuel price hedging, market price suppression, reliability and resiliency, economic development, carbon compliance costs, avoided air pollution, or environmental benefits.

Q. **Do the Settlement Stipulation and Order which resolved Docket No. 14-035-114 preclude the Commission from considering any categories of cost and benefit when determining the Export Credit value?**

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[1] Exhibit A – NARUC Staff Subcommittee on Rate Design, *Manual on Distributed Energy Resources Rate Design and Compensation.* p 133, footnote 193.
[2] *Ibid*, p 20.

A. No, the Settlement Stipulation does not limit the categories of cost and benefit that may be considered in determination of the Export Credit. The Stipulation provides an outline for the current proceeding, and specifies that, "in the Export Credit Proceeding, the Commission will determine a just and reasonable rate for export credits for customer generated electricity," and that "Parties may present evidence addressing reasonably quantifiable costs or benefits or other considerations they deem relevant."[3] The Settlement Stipulation does not specify the methodology to be used in determining the Export Credit value, or the categories of cost and benefit that will be considered. The primary directive regarding the Export Credit rate is that it be "just and reasonable." It may be based on evidence of quantifiable costs and benefits, issues related to rate design (for example, appropriate netting intervals,) and "other considerations."[4] The Commission's September 29, 2017 order approved the Settlement Stipulation and found "the Settling Parties' proposed path forward as regards to Export Credit Proceeding to be reasonable."[5]

Q. Is there legislative guidance regarding the value of exported distributed generation?

A. Yes. Utah's net metering statute provided guidance for determination of a just and reasonable ratemaking structure in light of the costs and benefits of excess customer-generated electricity. In 2014, Senate Bill 208 introduced amendments to Utah's net metering program that directed the Commission to:

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[3] Docket No. 14-035-114, Settlement Stipulation, August 28, 2017, Paragraph 30.
[4] *Ibid*.
[5] Docket No. 14-035-114, Commission Order Approving Settlement Stipulation, September 29, 2017, p 21.

> *(1) determine, after appropriate notice and opportunity for public comment, whether costs that the electrical corporation or other customers will incur from a net metering program will exceed the benefits of the net metering program, or whether the benefits of the net metering program will exceed the costs; and*
>
> *(2) determine a just and reasonable charge, credit, or ratemaking structure, including new or existing tariffs, in light of the costs and benefits.*[6]

Title 54, Chapter 15 ("Net Metering of Electricity") Section 104 provides additional guidance regarding the valuation of excess energy that is not used onsite by solar customers. Specifically, 54-15-104 (3) reads:

> *(3) Subject to Subsection (4), if net metering results in excess customer-generated electricity during the monthly billing period:*
> *(a) (i) the electrical corporation shall credit the customer for the excess customer-generated electricity based on the meter reading for the billing period at a value that is at least avoided cost, or as determined by the governing authority;*

Taken together, Sections 104 and 105.1 clearly indicate that the Legislature has never intended that credits for exported distributed generation be capped at avoided costs, and intends that it be compensated based on consideration of its costs and benefits. While there is no ubiquitous industry standard for calculating the value of exported distributed solar energy, there are well-recognized industry practices for evaluating costs and benefits. The most recent legislative guidance on the issue in Utah suggests that the value provided for distributed energy exports must be at least the avoided cost and should include all relevant benefits. The Company's proposal excludes many categories of benefits provided by distributed solar energy, and as such does not even amount to the avoided cost. It cannot be just and reasonable because it does not reflect the true value of distributed solar exports.

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[6] Utah Code § 54-15-105.1.

Q. What do you recommend?

A. I recommend that the Commission reject the Company's proposed Export Credit value because it does not consider benefits that are typically addressed in evaluations of distributed solar, including avoided capacity costs, ancillary services, fuel price hedging, reliability and resiliency, economic benefits, carbon compliance costs, avoided air pollution, and other environmental factors.

<u>The GRID model has significant shortcomings when applied to distributed generation and should not be used to quantify avoided energy costs.</u>

Q. How does the Company propose to quantify avoided energy benefits for the purposes of determining the value of the Export Credit?

A. The Company proposes to use the Proxy/Partial Displacement Revenue Requirement methodology ("Proxy/PDDRR") to quantify the energy component of the Export Credit value (Mr. MacNeil direct, lines 59 – 68). The Proxy/PDDRR methodology is the current Commission-approved methodology for evaluating "the incremental cost to the electric utility of alternative electric energy" to determine compensation for Qualifying Facilities of up to 80 MW in compliance with the Public Utility Regulatory Policies Act ("PURPA").[7] Although the Proxy/PDDRR methodology is used to calculate both avoided energy and avoided capacity costs for Qualifying Faculties, the Company proposes to eliminate the consideration of the capacity value for distributed solar (Mr. MacNeil direct, lines 66 – 68). Thus, the Company proposes to use only the PDDRR component to calculate the energy value (and not the Proxy component). The PDDRR

[7] 16 U.S.C. § 824a-3(b).

methodology calculates avoided energy costs for a resource based on two runs of the Company's Generation and Regulation Initiative Decision Tool ("GRID"), one that includes the operating characteristics of the new resource and one that does not.

Q. What is your response to the Company's proposal to use the PDDRR methodology to value avoided energy costs?

A. The PDDRR methodology relies on GRID, which lacks granularity necessary to determine the avoided energy costs of exported energy from distributed solar. Further, the GRID model is complex and relies on the use of confidential data, limiting transparency and opportunities for stakeholder review. The Company has already announced that they plan to retire the GRID model by 2022.

Q. Why do you say that the PDDRR methodology and GRID model are not granular enough for use to develop the Export Credit?

A. First, the PDDRR methodology is used to evaluate dispatch of system resources based on the addition of new utility-scale generating resources and is simply not intended to measure the impact of resources the size of a typical rooftop solar installation. The Company addressed this shortcoming by modeling a resource designed to represent 9,000 solar customers in order to "account for the granularity of the GRID model, which might not register changes measured in kilowatts" (Mr. MacNeil direct, lines 121 – 125). The resource modeled in GRID represents "approximately 50,000 megawatt-hours annually, or under six average megawatts" (Mr. MacNeil direct, lines 124 – 124). Even a resource of this size is very small relative to the system peak, and likely to be lost in the noise when evaluated using the GRID model. Second, the Company states that the hourly GRID model results cannot be used to determine an Export Credit value because they are confidential, and that the monthly GRID model results do not provide sufficient granularity for determining an Export Credit (Mr. MacNeil direct, lines 79 - 81). The confidential nature of the hourly GRID model results means that they cannot be used to inform a published Export Credit value, and it also creates barriers that limit transparency and make stakeholder review of the Company's modeling more difficult.

Q. Is the GRID model a durable tool for determining avoided energy costs?

A. No. The Company has stated that it plans to phase out use of the GRID model for rate making purposes by 2022, and is currently testing and implementing the AURORA model from Energy Exemplar as a replacement.[8] If the methodology for determining avoided energy costs is based on the GRID model, it will have to be re-evaluated almost immediately because the GRID model will be retired.

<u>Avoided energy costs should be based on hourly forward-looking projections of energy costs and data that are accessible to stakeholders.</u>

Q. How has the Company converted the GRID model output into an avoided energy cost?

A. The hourly output from the GRID model is confidential, so the Company has reduced GRID's output to a monthly avoided energy cost. A monthly average energy cost does not reasonably reflect the variation of actual energy prices that occur throughout the month. To address this issue, the Company proposes to 'shape' the monthly output from GRID into an hourly profile based on 36 months of historical fifteen-minute Energy Imbalance Market ("EIM") data (Mr. MacNeil direct, lines 85 – 95).

[8] Exhibit E – Vote Solar Data Request 12.1 to RMP

Q. How do you respond to the Company's hourly price shaping?

A. Use of monthly outputs from GRID will obscure the relatively infrequent periods when energy costs are very high and distributed solar exports should receive greater value. Shaping the monthly GRID output based on historical market prices from the EIM obscures the detail that exists in either dataset individually, and is not likely to result in an accurate forecast of hourly energy prices.

Q. Is hourly 'shaping' based on historical data likely to reflect the future costs of energy?

A. No. Energy markets are in the midst of a transition as utilities invest in zero-marginal fuel cost resources, resulting in extremely low or even negatively priced energy during certain hours. This presents a strong market signal that is also driving significant investment in energy storage, which will have a dramatic effect on future market prices. In 2017, a survey of 43 utility IRP's found that none planned to build any energy storage. By 2019, ten utilities planned to install a combined 6.3 GW of energy storage by 2029.[9] Backward-facing historical market prices are blind to the significant investments in energy storage resources that are taking place right now, and not likely to reflect actual market prices or result in accurate avoided energy costs.

Q. What is your recommendation for a more straightforward way to forecast hourly avoided energy costs?

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[9] Spector, J. (2020, January 24). 2019 Was the Year Everything Changed for Utilities and Energy Storage. *Greentech Media.* https://www.greentechmedia.com/articles/read/as-time-goes-on-utilities-want-loads-more-energy-storage.

A. I recommend that avoided energy costs are based on hourly, forward-looking projections of energy costs that can be made accessible to stakeholders, in which case price 'shaping' is not necessary. I support Vote Solar's proposed avoided energy cost, which is based on PacifiCorp's Official Forward Price Curve (Dr. Milligan direct, lines 318 – 347).

<u>Distributed solar exports provide capacity benefits, and this value should be considered in the Export Credit.</u>

Q. What is the Company's rationale for excluding the value of avoided capacity from the determination of the Export Credit value?

A. Rocky Mountain Power witness Mr. MacNeil states that the Export Credit program "is considered non-firm and no future capacity resources would be deferred," (Mr. MacNeil direct, lines 67 – 68) and therefore the Export Credit should not include a value for capacity.

Q. How do you respond?

A. I do not agree with Mr. MacNeil's assertion that exported solar energy does not defer future capacity resources.

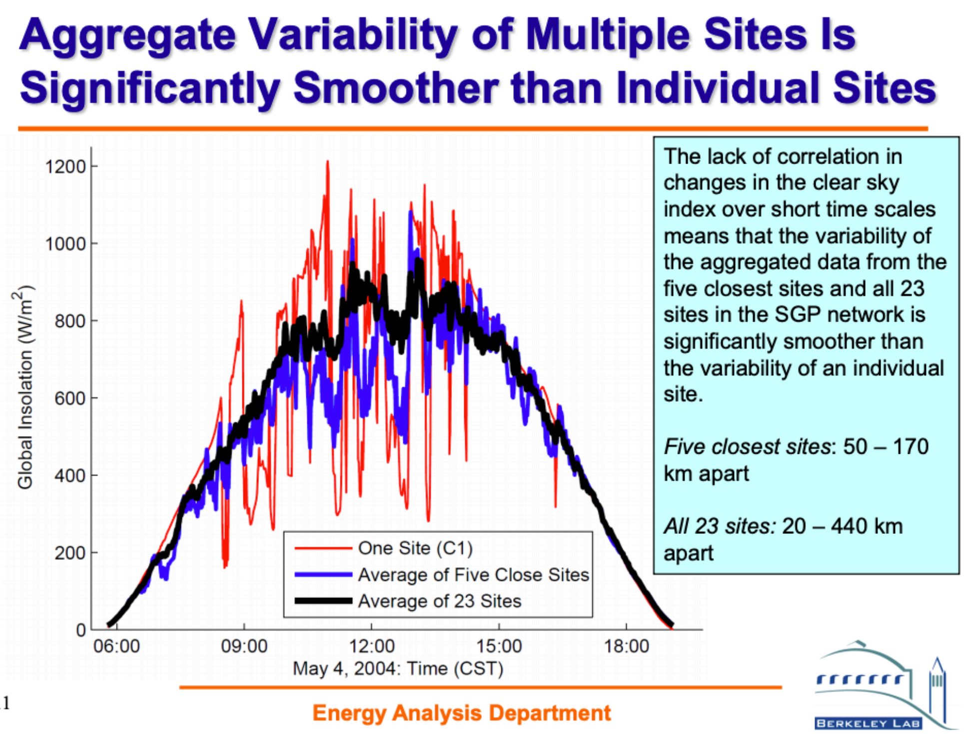
Q. What evidence do you have that energy exports from distributed solar can defer future capacity resources?

A. The geographic diversity of distributed solar resources results in significant "smoothing" of short-term variability that occurs at an individual system level. As a result, methodologies for calculating the capacity value of distributed solar should be based on the contributions of exported energy in the aggregate. In the aggregate, energy exports from distributed solar are predictable and reliable, and will defer future capacity resources.

Q. How does geographic diversity result in predictable and reliable energy exports from distributed solar?

A. Aggregating data from just 23 locations, as shown in Figure 2, results in a much smoother and more regular solar insolation profile. Geographic diversity also reduces the likelihood that a large number of rooftop solar customers will fail to deliver energy due to an outage. Even a serious catastrophic event, like a hailstorm or windstorm that damages solar panels, will only affect customers in that limited geographic area.

Figure 2: Illustration of solar insolation smoothing across geographic locations.[10]



[11]

[10] Mills, A. & Wiser, R. (2010, September). *Implications of wide-area geographic diversity for short-term variability of solar power.* Lawrence Berkeley National Laboratory. https://emp.lbl.gov/sites/all/files/presentation-lbnl-3884e-ppt.pdf.

Q. Mr. MacNeil also asserts that exported energy from rooftop solar customers should not receive value for capacity because as a non-firm resource, it is not subject to the contractual terms that "protect the utility and non-participating customers from non-performance and are essential to mitigating the risks associated with long-term contracts" (MacNeil direct, lines 72 – 74). How do you respond?

A. I disagree. FERC addressed the question of whether small energy resources that do not deliver firm power can provide capacity value, and finds that:

> *In some instances, the small amounts of capacity provided from qualifying facilities taken individually might not enable a purchasing utility to defer or avoid scheduled capacity additions. The aggregate capability of such purchases may, however, be sufficient to permit the deferral or avoidance of a capacity addition. Moreover, while an individual qualifying facility may not provide the equivalent of firm power to the electric utility, the diversity of these facilities may collectively comprise the equivalent of capacity.*[11]

Whether or not it is contracted as a non-firm resource, the risk that non-performance of a solar customer will result in impacts on the utility or non-participating customers is very low. Rooftop solar installations are very small, relative to typical utility generation resources and relative to total customer load. It would take the completely implausible event that more than 10,000 typical residential solar installations had an outage at the same time to equal the energy exports lost if a single 80 MW solar QF goes offline. If you assume that solar customers only export about half of the power that they generate, then it would take more than 20,000 solar customers to equal the output of a QF. It is extremely unlikely that solar customers will fail to deliver power in a way that puts the

[11] FERC Order No. 69, 45 Fed. Reg. 12214 at 12227.

Company at risk of incurring significant costs from re-dispatching resources or experiencing a loss of load event.

Q. Does the Company account for exported power from rooftop solar customers when determining its future capacity needs in the Integrated Resource Planning process?

A. Yes. The Company models forecasted rooftop solar generation as a reduction to load on an hourly basis, which reduces the total electricity demand that the Company plans to serve. The Company provides the following description of how the decrement to load impacts the Company's forecasted need for both energy and capacity: "In the 2019 IRP, the hourly retail load at a location is first reduced by hourly private generation at the same location. The system coincident peak is determined by summing the net loads for all locations (topology bubbles with loads) and then finding the highest hourly system load by year" (2019 IRP, p 112 – 113). To the extent that distributed solar reduces the system coincident peak, it also reduces the need for new capacity resources. Table 5.12 (2019 IRP, p 115 – 116) shows that the Company's modeling of private generation results in a reduction of system summer peak load by 146 MW in 2020 and 674 MW by 2038.[12]

Q. What does this mean?

A. The Company is accounting for the capacity value of distributed solar in its long-term resource modeling by aggregating the resources together, rather than looking at them individually. The 2019 IRP shows that energy generated by distributed solar on an

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[12] This represents a sum of the "private generation" reductions to load for the East and West balancing areas as identified in Table 5.12 in the 2019 IRP.

hourly basis results in a reduction to system peak load that defers procurement of capacity resources. Were it not for the energy generated by rooftop solar, it is likely that the Company would identify a capacity need sooner. It is not appropriate to remove the capacity value from the Export Credit valuation when the Company's long-term resource plan is already relying on it to determine future capacity needs.

Q. What additional concerns do you have about the Company's proposed Export Credit value?

A. The main determinant of whether a customer chooses to export power to the grid versus finding a way to use it onsite (for example by storing power in a battery) is the Export Credit rate. I am concerned that the Company's proposal sets the Export Credit at a value so low that it not only denies customers who have rooftop solar of the fair value for the energy they export to the grid, it also sends a strong price signal to rooftop solar customers that discourages them from exporting energy to the grid.

The Company's proposed Export Credit value is so low that it would discourage most customers from investing in distributed solar and severely curtail the benefits that distributed energy resources provide to the grid. However, customers who can afford to do so will install a battery to store solar energy and reduce their own grid purchases, rather than exporting energy to the grid for almost no value. When solar energy exports are undervalued, solar customers are incentivized to use all of their energy onsite, which may not be in the best interest of the system and other customers.

In contrast, when the Export Credit value is sufficient, solar customers will be incentivized to export energy to the grid. This allows the grid, and non-solar customers, to benefit from the growth of distributed energy resources and private investments in clean energy. The low Export Credit value that The Company has proposed will create a paradigm where only the wealthiest Utahns install solar and reap the benefits of distributed energy, and solar customers opt out of exporting energy that provides grid benefits.

Q. Please summarize your recommendations regarding the Company's proposed Export Credit value.

A. I recommend that the Commission:

- Reject the Company's proposed Export Credit value because it does not consider many quantifiable benefits of distributed energy exports.
- Determine avoided energy costs using hourly forward-looking projections of energy costs and data that is accessible to stakeholders, and not the PDDRR methodology or GRID.
- Find that the Export Credit value should include consideration of the capacity benefits from aggregated distributed energy exports.

B) Response to the Division of Public Utilities

Q. Please summarize your response to the Division of Public Utilities' direct testimony.

A. The Division's assessment of the Company's proposal is premised on the assumption that the Commission-approved methodology for determining avoided costs for Qualifying Facilities resources in Utah is a reasonable method for valuing distributed energy exports, but I do not agree with this interpretation. Utah's QF avoided costs methodology was developed to value avoided costs for utility-scale resources, and does not account for the benefits of smaller renewable energy resources interconnected on the distribution system. PURPA does not require states to use the same methodology for valuing energy from QFs and distributed generation resources. In fact, PURPA clearly distinguishes between Qualifying Facilities and distributed on-site generation resources, and delegates treatment of distributed energy resources to the states. I also respond to the Division's assessment of capacity value. The Division supports the Company's decision to exclude a capacity value on the grounds that the capacity value of solar is low, but does not provide evidence supporting a capacity value of zero. I continue to recommend that the Commission include a value for the capacity benefits of aggregated distributed energy exports in the Export Credit. Last, the Division expresses concern that distributed solar energy results in increased wear and tear on the distribution system. In response, I recommend that the Commission explore this issue through a transparent Integrated Distribution System Planning process, where strategies to mitigate grid impacts of distributed energy resources can be considered alongside opportunities to maximize their benefits.

The Proxy/PDDRR methodology used for Qualifying Facilities should not be used to quantify the costs and benefits of distributed solar resources.

Q. The Division presents an evaluation of the Company's proposal and "generally finds RMP's proposal reasonable as it applies a method that better aligns export credits to avoided costs while giving RMP an opportunity to recover fixed system costs without imposing additional costs on other users" (Mr. Davis direct, lines 47 - 49). How do you respond?

A. I do not agree with the Division's characterization of the Company's proposed Net Billing Program. As previously described, the Company's proposal undervalues energy exported from distributed energy resources because it excludes consideration of significant benefits that are attributable to distributed solar exports and should be considered in determining the value of exported solar energy. The Division's finding that the Company's proposal is reasonable is premised on the assumption that the Commission-approved method used to determine avoided costs for QFs is sufficient to evaluate the avoided costs that result from exported solar energy. However, as discussed in response to the Company's testimony above, and in my direct testimony, energy exports from distributed solar provide a variety of quantifiable benefits that are not accounted for in the Commission-approved QF avoided cost methodology. Many of these benefits fundamentally are not provided by the centralized generating resources for which the QF methodology has been developed.

Q. Does the Division support use of the Commission-approved QF avoided cost methodology, specifically, for quantifying the value of exported solar energy?

A. Generally, but with a caveat. Mr. Abdulle states, "The Division concurs with RMP that the same method used in the calculation of the avoided costs for Schedule 37, with some modifications, should be used to determine the value of the solar export credit" (Abdulle direct, lines 61 – 63). Mr. Abdulle does not clarify whether the modifications to the Proxy/PDDRR methodology that the Company has already described in its proposal are sufficient, or whether additional modifications are necessary.

Q. Does PURPA specify that distributed solar should be valued in the same way as qualifying facilities?

A. No. PURPA clearly defines qualifying "cogeneration and small power production" facilities of up to 80 MW and specifies that electric utilities must purchase all electricity generated by such facilities at rates that are "just and reasonable to electric consumers" and "do not discriminate against qualifying cogenerators or qualifying small power producers."[13] In 2005, Congress amended PURPA and directed that "each electric utility shall make available upon request net metering service to any electric consumer that the electric utility serves" and that State regulatory authorities should initiate an investigation into implementing a net metering program within two years.[14] In contrast with the specific and detailed requirements for acquiring energy from qualifying facilities, PURPA delegates treatment of distributed generation entirely to the states and does not provide specific guidance regarding interconnection, rate design, or compensation for distributed energy resources. This discrepancy indicates that Congress intended to distinguish between qualifying facilities and distributed on-site generation resources, and envisioned a different relationship between distributed resources and the utility than the relationship already defined by PURPA for qualifying facilities.

Q. Do you have other concerns about the use of the PDDRR methodology for the purposes of quantifying an Export Credit?

A. Yes. The PDDRR methodology is directly tied to the valuation of QF resources in compliance with PURPA. The Company regularly proposes changes to the PDDRR methodology in that context, which are often contested.[15] If the Proxy/PDDRR methodology is used to quantify the value of large QFs up to 80 MW, small QFs up to 3 MW, and energy exports from distributed solar, then any future proceedings related to the Proxy/PDDRR methodology will have to consider compliance with statutory

[13] 16 U.S.C. § 824a-3(b).
[14] 16 U.S.C.A. § 2621 (West).
[15] The Company proposed changes to the PDDRR methodology that were contested in January 2013 (Docket No. 12-035-100), August 2017 (Docket No. 17-035-17), and January 2020 (Dockets No. 19-035-18).

requirements related to all of these types of resources. Given the significant differences between an 80 MW QF resource and distributed solar resources interconnected on the distribution system, it is better to approve a methodology that is designed to value distributed energy resources rather than repurpose a methodology developed for much larger resources that requires frequent revisions.

<u>The Division's assessment of the Company's proposed Net Billing Program does not consider many of the benefits of distributed energy resources.</u>

Q. Does the Division address the question of quantifying a capacity value for exported energy from distributed solar resources?

A. Not directly. Mr. Davis states, "Solar generation is an intermittent resource that produces during daylight hours. The downside to the technology is that it can drop off and return over short periods of time, or remain marginal for longer periods of time. It is a challenge to forecast when these cycles might occur making its capacity contribution low" (Mr. Davis direct, lines 321 – 324).

Q. Do you agree with Mr. Davis' characterization of solar resources?

A. I agree that solar generation is different from other types of generating resources in that it is a variable resource that produces during daylight hours, and that as a result its capacity contribution is different from other resources.

Q. Is it reasonable to omit a value for the capacity that energy from solar exports provide because their value is "low?"

A. No. The Division notes that the capacity contribution from solar is low, but does not assert that it is zero. It is appropriate to quantify the value of capacity that aggregated distributed solar provides to the system using a methodology that accounts for solar's variable generation profile. I support the capacity values proposed by Vote Solar (Dr. Milligan direct, lines 557 – 566 and Dr. Yang direct, lines 79 – 89) and Vivint Solar (Dr. Worley direct, lines 171 – 223).

Q. Does the Division address other benefits resulting from exported energy?

A. Yes. Mr. Davis notes that, "the avoided cost methodology provides an opportunity for costs and benefits to be added to the basic avoided energy charge when prudent," (Mr. Davis direct, lines 461 – 463), and notes that "as customer generation penetration increases, ancillary services, such as frequency and VAR correction, might become valuable thus increasing the export credit" (Mr. Davis direct, lines 529 – 531).

Q. How do you respond?

A. I agree that any costs or benefits that can be quantified should be added to the avoided energy value to determine an Export Credit. To the extent that benefits are identified but cannot be quantified, the Commission should create a placeholder so the benefit can be quantified in the future. Ancillary services are a good example of benefits that are difficult to quantify now, but should be given a placeholder.

Q. The Division expresses concern that rooftop solar increases variability to the grid and can "wear out certain distribution equipment at a faster rate than would otherwise occur" (Mr. Davis direct, lines 186 – 188). How do you respond?

A. The Division's concern about wear and tear stems from two-way power flow that occurs when solar customers alternate between importing energy and exporting energy to the grid. As a result of this variability, certain distribution system components might operate more frequently in response to more rapidly changing conditions on the grid. In response to discovery about the nature of the Mr. Davis' concerns, the Division cited a series of presentations hosted by WIEB and WIRAB and delivered by Dr. Debra Lew and Nick Miller that provide an extensive review of issues related to DER and grid reliability.[16] An overarching theme of these presentations is that the impacts of renewable energy resources, including distributed solar, may present challenges for maintaining grid reliability in the future, but that these resources also present opportunities to improve the flexibility and responsiveness of the grid (see Exhibits H and I). For example, new requirements for smart inverter capabilities allow distributed solar to support the grid by riding through voltage and frequency disturbances; provide functionality related to voltage regulation, communications, control and ancillary services; and "accommodate more DER and helps WECC maintain reliability during events."[17] Dr. Lew and Mr. Miller conclude that "we aren't getting the best value out of most of our DERs," because we are "chasing problems from DERs rather than exploiting DERs."[18] Examples of unrealized, but real, benefits include the ability of distributed energy resources to defer distribution upgrades, provide demand-side flexibility to integrate variable energy resources, manage electrification to avoid increasing distribution capacity, and meet peak demand.[19]

As I discussed at length in my direct testimony, leveraging the flexibility capabilities of distributed energy resources is important to fully realize the benefits they are capable of providing to the grid and utility customers. The Division's concern about wear and tear highlights the need to ensure that utilities, regulators, and policymakers explore how

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[16] Exhibit F - Vote Solar data request 2-1.3 to DPU.
[17] Exhibit H – WIEB/WIRAB Tutorial Short-term reliability: System Stability Part 2.
[18] Exhibit I – WIEB/WIRAB Tutorial 100% Clean Energy and Distributed Energy Resources.
[19] *Ibid*.

future investments in the distribution system can work to both minimize the impacts of distributed energy resources *and* maximize their benefits. In my direct testimony, I referenced a resource by Gridworks entitled *The Role of Distributed Energy Resources in Today's Grid Transition* (Exhibit J). This resource describes opportunities to leverage distributed energy resources in detail, and concludes that Integrated Distribution System Planning is important to allow utilities and regulators to evaluate the full implications of distributed energy resources and identify opportunities where distributed energy resources can provide grid services at lower cost.

Q. Is there evidence that investments by solar customers benefit the distribution system?

A. Yes. If the distribution system requires an upgrade to interconnect a new distributed solar system safely, the solar customer is responsible for the full cost of the upgrade. As a result, solar customers are paying out of pocket for upgrades to distribution system equipment that is already some portion of the way through its useful life. Non-solar customers benefit from new equipment at no expense. According to information the Company has provided in response to discovery, customer Contributions in Aid of Construction to interconnect distributed solar equaled $382,725 in 2019. (Dr. Volkmann direct, Figure 6.)

Q. Is the issue of wear and tear on the distribution system an immediate concern?

A. No. The Division states that equipment that might experience wear and tear is designed to operate for 50 to 70 years (Mr. Davis direct, footnote 14), and that the Division is not aware of any documentation of wear and tear that is occurring on the system.[20]

Q. How do you recommend addressing the Division's concern?

A. I recommend that this issue be considered as part of a transparent Integrated Distribution System Planning process. New and improved distributed energy technologies are providing services and capabilities that contribute to improved grid flexibility and modernization. Distributed energy technologies like rooftop solar, EV chargers, and controllable loads may result in impacts to the grid as well as cost savings and benefits for customers. A comprehensive, transparent, and holistic Integrated Distribution System Planning process can explore strategies to mitigate grid impacts of distributed energy resources alongside opportunities to maximize their benefits. Integrated Distribution Planning can also be used to evaluate the benefits of advanced technologies, test new rate options, or test provision of grid services. A holistic evaluation of future distribution system investments ensures that customers receive the maximum benefits from distributed energy resources and are truly benefiting from least-cost, least-risk investments in the future distribution system.

Q. Please summarize your recommendations in response to the Division.

A. The Commission should not limit evaluation of the Export Credit value to the factors considered in the Proxy/PDDRR methodology, which is designed for QFs and does not account for the benefits of distributed energy resources. I further recommend that the

[20] Exhibit K - UCE Data Request 2.4 to DPU.

Commission include a value for the capacity benefits of aggregated distributed energy exports in the Export Credit. Last, I recommend that the issues of grid impacts from distributed energy resources and opportunities to maximize the benefits of these resources be explored through an Integrated Distribution System Planning process.

C) Response to Vote Solar's Direct Testimony

Q. Please summarize your response to the findings of Vote Solar's witnesses.

A. Vote Solar's proposal represents the most reasonable and complete recommendation for the Export Credit value before the Commission at this time. The value resulting from Vote Solar's evaluation is comparable to the results from a value of solar study commissioned by Utah Clean Energy in 2014. I support the costs and benefits identified by Vote Solar for the purposes of determining the Export Credit value. Vote Solar has not quantified the benefits of grid support services and reliability and resilience, and I provide additional information about analysis of the value of these benefits. I recommend that the Commission create a placeholder for these benefits so that they can be quantified through future proceedings. Finally, I recommend that the Export Credit include consideration of the benefits of carbon-free resources, including carbon compliance costs, avoided health impacts, and societal impacts to the economy and well-being, and I support the values Vote Solar has proposed. I conclude that the societal benefits may also be considered in the rate design process, where the Commission may balance the science of determining precise cost and benefit quantification with the art of designing a rate that is in the best interest of the future well-being of Utah.

<u>Vote Solar's proposal represents the most reasonable and complete recommendation for the Export Credit value before the Commission at this time</u>

Q. Please describe the findings presented by Vote Solar's witnesses and their proposal.

A. Vote Solar's direct testimony addresses the cost and benefit categories that are commonly included in industry standard cost-benefit analyses of distributed solar. Based on this analysis, Vote Solar has quantified the total value of exported solar energy to be 22.22 cents per kilowatt-hour (Mr. Constantine direct, Table 1). Of this, 10.9 cents per kilowatt-hour is characterized as "utility benefits" and 11.3 cents per kilowatt-hour is characterized as "community benefits."

Q. Vote Solar's proposed avoided energy value is based on market prices from three trading hubs using the Company's Official Forward Price Curve applied to the shape of energy exports from distributed solar. How do you respond?

A. Vote Solar's approach quantifies the value of energy exports from distributed solar based on data that represents the actual export profiles from existing solar customers and the Company's own forecast of market prices. This is a reasonable approach for valuing solar energy exports because it is based on the Company's own forecast of the cost to acquire energy in the future. As I have already discussed in response to the Company's direct testimony, I support the avoided energy value Dr. Milligan has calculated (Dr. Milligan direct, lines 318 – 347).

Q. Are there other studies that have sought to approximate a value for solar in Utah, and how do they compare to Vote Solar's findings?

Yes. In 2014, Utah Clean Energy commissioned Clean Power Research ("CPR") to conduct an evaluation of the value of distributed solar in Utah. CPR's study considered six categories of value, which resulted in a value of solar of 11.6 cents per kilowatt-hour (Exhibit E). CPR's analysis is based on 2014 data and there are methodological differences between their study and the analysis by Vote Solar's experts. However, the findings from CPR's analysis are generally comparable to the findings of Vote Solar's experts.

I recommend that the Commission create a placeholder for the benefits of ancillary services and reliability and resilience so that they can be quantified in the future.

Q. Vote Solar has not quantified certain categories of benefit, including ancillary services, reliability and resilience, market price suppression, and avoided fossil fuel lifecycle costs. How should the Commission weigh these categories given it does not have evidence to quantify them at this time?

A. Where a category of benefit is demonstrated to exist but its value cannot be quantified, the Commission should create a placeholder and continue to explore methodologies to better quantify the value in future proceedings. Creating a placeholder for unquantified benefits allows for future exploration of their value through focused proceedings and avoids the need to re-litigate the Export Credit as a whole. Further, when categories of benefit cannot be quantified, the Commission can still consider qualitative information about their value to inform the development of a "just and reasonable" rate. Although certain benefits are challenging to quantify, failure to account for them will result in an Export Credit that undervalues exports from distributed solar, which may lead to significant reductions to the uptake of distributed solar thereby limiting the potential for the grid and all customers to leverage the benefits that distributed energy resources provide.

Q. Vote Solar has not quantified grid support services (ancillary services). What are grid support services, and why should they be considered in the Export Credit?

A. Dr. Berry describes grid support services as "reactive supply, voltage control, regulation or frequency response, energy imbalance, or load-shaping services" (Dr. Berry direct, lines 395 - 397). As discussed in my direct testimony, and in my response to the Division above, inverter-based technologies can provide beneficial services to the grid. Some states have already begun to implement communications and control standards to leverage the benefits of smart inverters. For example, the Illinois Commerce Commission created a rebate of $250/kW DC for solar installations that use an approved smart inverter at specified default settings.[21] If the Commission does not determine a value for grid support services in this proceeding, then it is important to create a placeholder for grid support services in order to explore their value in the future.

Q. Vote Solar has identified, but not quantified, reliability and resilience. How does rooftop solar provide the benefit of reliability and resilience?

A. It is widely acknowledged that distributed solar, especially when paired with energy storage, will contribute to improved resiliency by providing distributed sources of backup power. In the event of a grid outage, distributed backup power delivers a wide variety of benefits. For example, emergency backup power can help businesses

[21] ComEd DG Rebate. https://www.comed.com/SiteCollectionDocuments/SmartEnergy/DGRebateApplication.pdf.

continue operations during a blackout and avoid the loss of refrigerated products, data, or costly interruptions to manufacturing processes. Backup power can also be used to keep critical facilities like air conditioning, medical services, or communications equipment online in the event of a blackout, which results in an improved response in the event of a catastrophic event like an earthquake and prevents losses of life. When distributed backup power is used in place of a diesel generator, it is possible to quantify the value from avoided fuel savings or from extending the runtime of a generator with limited fuel supplies. The resiliency benefits of solar and storage systems are challenging to quantify because they can provide benefits to individual customers, groups of customers, or to the grid as a whole, and because different stakeholders have widely varying values for the benefits of resilience.

Q. How have state policymakers and regulatory agencies begun to explore the benefits of resilient solar systems?[22]

A. Sixteen states have initiated programs to explore the benefits of resilient solar, which include pilot installations of resilient solar on Florida schools, formal studies of microgrids, and programs or policies to support microgrid deployment.[23] For example,

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[22] According to NARUC's publication *The Value of Resilience for Distributed Energy Resources*, "Resilient solar is defined as "solar PV systems which can operate during electrical outages, provide emergency power to facilities, as well as provide electricity under normal conditions. The term 'resilient solar' includes technologies such as a solar PV System paired with: 1) battery backup… 2) auxiliary generation such as a diesel generator to reduce fuel needs or a combined heat and power system, 3) an inverter with emergency 'daylight' power outlet." See Exhibit L.

[23] Exhibit L – NARUC Value of Resilience for Distributed Energy Resources, p 9.

the California PUC has opened a proceeding to explore using microgrids in order to mitigate the impacts of power shutdowns during fire season.[24]

Q. Is there a methodology for quantifying the value of resilience?

A. Although considerable work has been done to quantify the value of resilient solar, there is not agreement on a "one size fits all" approach to valuing resilient solar, especially in regulatory proceedings. NARUC recently published a report called *The Value of Resilience for Distributed Energy Resources* which recognizes the resilience benefits of distributed solar and finds that "new technologies such as resilient solar systems offer distinct advantages over diesel generation, including emissions-free generation, an unlimited fuel supply, and the ability to generate savings and revenue streams when not serving in an emergency power role."[25] NARUC's report reviews practices for calculating the value of resilient solar installed on the distribution system in order to address questions of interest to utility regulators. The authors conclude that:

> *"The practice of integrating resilient DERs into resilience planning is still at an early stage. Although it is clear that DERs can offer resilience benefits, it is unclear how to determine the value of those benefits. Identifying appropriate methodologies to calculate the value of resilience will be an important step toward ensuring that resilient DERs are considered alongside alternatives and integrated into future energy infrastructure and investment planning efforts."*[26]

Although the authors do not identify a methodology for quantifying a value for solar, they caution that omitting the value of resilience in a cost-benefit analysis "undervalues

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[24] Hunt, T. (2020, March 26). Getting California's microgrids interconnected is even more important now. *PV Magazine.* https://pv-magazine-usa.com/2020/03/26/getting-californias-microgrids-interconnected-is-more-important-now-in-times-of-crisis/.

[25] Exhibit L, p 6.

[26] Exhibit L, p. 4.

the benefits created by resilient DERs and would constrain investments in projects that do not create sufficient additional benefits to move forward."[27]

Q. How should the Commission quantify the value of resilience and reliability?

A. I recommend creating a placeholder value and exploring the issue more in the future.

Q. Why should the Commission create a placeholder for categories of cost or benefit haven't been quantified, if their value cannot be quantified and therefore cannot be incorporated into the Export Credit?

A. Creating a placeholder for unquantified benefits allows for future exploration of their value through focused proceedings and avoids the need to re-litigate the Export Credit as a whole. When categories of benefit cannot be quantified, the Commission can still consider qualitative information about their value to inform the development of a "just and reasonable" rate. Although certain benefits are challenging to quantify, failure to account for them will result in an Export Credit that undervalues exports from distributed solar, which may lead to significant reductions to the uptake of distributed solar, thereby limiting the potential for the grid and all customers to benefit from distributed energy resources.

<u>The Export Credit should appropriately account for the benefits of carbon-free resources, including carbon compliance costs, avoided health impacts, and benefits to the economy and well-being of Utah from reduced carbon emissions.</u>

Q. Vote Solar has proposed a value for avoided carbon compliance costs (Dr. Berry direct, lines 729 – 743). How do you respond?

[27] Exhibit L, p. 28.

A. The Export Credit value should reflect the benefits associated with zero-carbon energy resources. One of these benefits is the risk mitigation and avoided cost of compliance with future carbon regulation, which is a cost that will accrue directly to utility customers.

Q. Why should compliance costs be considered, if there is currently regulation limiting carbon emissions in Utah?

A. According to the most recent information from the Intergovernmental Panel on Climate Change (IPCC), limiting global temperature increases to 1.5 degrees Celsius above pre-industrial levels will require that global carbon dioxide emissions decline by about 45% by 2030 and reach net zero by 2050.[28] Achieving these reductions requires "rapid and far-reaching transitions in energy, land, urban and infrastructure (including transport and buildings), and industrial systems" that are "unprecedented in terms of scale."[29] Given the widespread scientific consensus regarding the effects of climate change it is unreasonable to assume that future market conditions will include a zero cost for carbon.

Q. What other information indicates a trend toward carbon pricing?

A. Forty countries and jurisdictions already have carbon pricing mechanisms, which apply to about 13% of annual global greenhouse gas emissions.[30] Twelve U.S. states have adopted carbon pricing policies.[31]

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[28] Exhibit M – IPCC Special Report Headline Statements from the Summary for Policymakers.
[29] *Ibid*.
[30] The World Bank. *Pricing Carbon.* https://www.worldbank.org/en/programs/pricing-carbon.
[31] Center for Climate and Energy Solutions. *Market-Based State Policy.* https://www.c2es.org/content/market-based-state-policy.

Q. What policies or guidance regarding the need to curtail carbon dioxide emissions exist in Utah?

A. In 2018 the Utah legislature passed HCR7, 'Concurrent Resolution on Environmental and Economic Stewardship'.[32] This bill recognizes the impacts and risks that climate change poses to Utahns, "including wildfires, water scarcity, and flooding."[33] Further, HCR 7 encourages corporations and state agencies to reduce emissions. In January 2020, at the request of the Utah legislature, the Kem C. Gardner Policy Institute prepared a Roadmap to improve air quality and address causes and impacts of a changing climate. "The Utah Roadmap: Positive Solutions on Climate and Air Quality" recommends formal state adoption of a goal to reduce carbon dioxide emissions statewide by 50% by 2030 and 80% by 2050. The Roadmap further recommends that Utah "become a leader in national discussions about how to harness the power of market forces and new technologies to reduce carbon emissions in a way that protects health, sustains economic development, and offers other benefits to Utahns," and support policies to "promote, incentivize clean distributed generation and storage."[34]

Q. Vote Solar proposes to value avoided carbon compliance costs based on the Company's "high" CO_2 price scenario from the IRP (Dr. Berry direct, lines 739 – 753). Do you support this value?

A. Yes. Dr. Berry's CO_2 price scenario is reasonable compared to other forecasts of carbon compliance costs. The Company models four carbon price scenarios in the 2019

[32] Utah State House of Representatives Concurrent Resolution 7 (2018).
[33] Utah State House of Representatives Concurrent Resolution 7 (2018) Lines 45-46.
[34] Exhibit N - Kem C. Gardner Policy Institute *The Utah Roadmap* p 2, p 16.

Integrated Resource plan – zero, medium, high, and the social cost of carbon[35] – so Dr. Berry's recommendation actually represents a medium forecast of future CO_2 costs from the Company's long-term resource planning process. The price scenario Dr. Berry has chosen begins at $22/ton in 2025 and reaches approximately $100/ton by 2040 (Dr. Berry direct, lines 741 – 742). This price scenario falls between the near-term values for the U.S. Energy Information Administration's 2020 medium and low CO_2 price scenarios (which equal approximately $20 and $30, respectively, by 2025).[36] Dr. Berry's recommendation is also low relative to the CO_2 price necessary to limit warming to 1.5 degrees Celsius, which requires a CO_2 price of $40 - $80/ton by 2020 and $50 - $100/ton by 2030.[37] As such, Dr. Berry's proposed value represents a reasonable proxy for the costs of carbon compliance that will incentivize private investments in zero-carbon resources to mitigate risks and to avoid future costs.

Q. Vote Solar proposes inclusion of a value for the health benefits from reduced air pollution and the benefits of reduced carbon emissions. Should both these values be included in calculation of the Export Credit?

A. Yes, these benefits should be accounted for in the determination of the Export Credit. The health impacts of climate change are real and will accrue to all Utahns in material ways that can be quantified. Similarly, the future costs and risks of climate change to Utahns are significant. As a zero-carbon resource, exported solar energy should be

[35] 2019 Integrated Resource Plan, Volume I (2019, Oct 18). p 179.
[36] U.S. Energy Information Administration. (2020, March 17.) EIA analysis shows how carbon fees would reduce carbon dioxide emissions in the near term. https://www.eia.gov/todayinenergy/detail.php?id=43176.
[37] Carbon Pricing Leadership Coalition. (2017, May 29). Report on the High-Level Commission on Carbon Prices. p 3. https://www.carbonpricingleadership.org/report-of-the-highlevel-commission-on-carbon-prices.

credited with avoided costs associated with the health, economic, and environmental impacts of climate change.

Q. What are the costs of failing to transition to renewable energy resources quickly enough to limit global temperature rise to 1.5C?

A. The risks and costs of climate change include higher temperatures, more severe heat events, depleted reservoirs and snowpack, and increased forest fires in the western United States. These impacts will result in impacts to our economy, health, costs that affect the provision of electricity, and costs that accrue to Utahns as negative externalities and impact well-being.

Q. Please describe the health costs associated with climate change.

A. Ground level ozone is an air pollutant that can cause permanent lung damage, in addition to shortness of breath, coughing, and sore throat. As temperatures rise, the number of bad ozone days is expected to increase, since heat accelerates the chemical reactions that cause ozone. The American Thoracic Society ranked Salt Lake City as the "6th least improved" city when it comes to ground level ozone, and found that mortality from ozone is on the rise.[38] Hotter temperatures associated with climate change lead to a longer and more dangerous fire seasons, which has a significant impact on summer air quality and poses threats to the health and safety of Utahns in the paths of fires. According to an analysis based on data from the National Fire and Aviation Management website, the annual average wildfire season in the Western U.S. is 105 days longer, burns six times as many acres, and has three times as many large fires

[38] American Thoracic Society. *Health of the Air city data*. https://healthoftheair.org/city-data/41620-salt-lake-city-ut

compared to the 1970s.[39] California recently experienced its most deadly and destructive fire seasons in history in 2017 and 2018, resulting in $40 billion in damage and 139 deaths.[40] Utah is also forecast to experience hotter temperatures and longer heatwaves, which are associated with fatalities due to heat stroke and increased hospital admissions for cardiovascular, kidney, and respiratory disorders.[41]

Q. What are the costs that affect the provision of electricity?

A. The impacts of climate change will impact electricity generation. Rising temperatures are likely to increase the frequency and duration of peak load events that the utility must serve in the summer months. Hotter and drier weather contributes to a rise in the incidence of forest fires that is causing damage to infrastructure and grid outages. In respond to destructive wildfires, PG&E created a proactive Public Safety Power Shutoff plan and shut off power to nearly a million utility customers in during two events in 2019.[42] Utah H.B. 66, "Wildfire Planning and Cost Recovery Amendments," passed during the 2020 legislative session, recognizes the importance of planning for wildfires and directs the Company to prepare a wildfire protection plan in order to identify areas that are most at risk and develop procedures and standards to reduce the

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[39] Climate Central. *U.S. Wildfire Tracker*. https://medialibrary.climatecentral.org/extreme-weather-toolkits/wildfires.

[40] Bartz, K. (2019, February 27). Record wildfires push 2018 disaster costs to $91 billion. *Center for Climate and Energy Solutions.* https://www.c2es.org/2019/02/record-wildfires-push-2018-disaster-costs-to-91-billion/; Commissioners Peterman, C., Jones, D., Kahn, M., Nava, P, & Wara, M. (2019, June 17). Final Report of the Commission on Catastrophic Wildfire Cost and Recovery. *California Commission on Catastrophic Wildfire Cost and Recovery.* https://opr.ca.gov/docs/20190618-Commission_on_Catastrophic_Wildfire_Report_FINAL_for_transmittal.pdf.

[41] Centers for Disease Control and Prevention. Temperate Extremes. https://www.cdc.gov/climateandhealth/effects/temperature_extremes.htm.

[42] Pacific Gas & Electric. (2019, November 18). PG&E Public Safety Power Shutoff (PSPS) Report to the CPUC October 26 & 29, 2019 De-Energization Event. https://www.pge.com/pge_global/common/pdfs/safety/emergency-preparedness/natural-disaster/wildfires/PSPS-Report-Letter-10.26.19.pdf.

risk that utility equipment will start a wildfire. H.B. 66 also allows the utility to "recover in rates all prudently incurred investments and expenditures, including the costs of capital, made to implement an approved wildland fire protection plan," ensuring that ratepayers will pay the costs of investments required to mitigate the risk of wildfires caused by utility power lines.[43] Disruptions in seasonal water availability affects dispatch of hydro resources and thermal resources (which rely on water for cooling). Utah's Recommended State Water Strategy notes that "A warming climate poses serious challenges for Utah's water future and our ability to plan and prepare for that future."[44] While the climactic trends themselves will impact electricity generation in Utah, increased variability and unpredictability will also make long-term planning processes more difficult and subject to uncertainty.

Q. **What other costs and threats accrue to Utahns that are associated with carbon emissions?**

A. Additional costs and threats to Utahns that result from the effects of climate change are varied and widespread. Projected decreases in snowpack will have severe economic consequences for Utah's tourism and recreation industries. A report commissioned by the Park City Foundation estimates that by 2030 a decrease in snowpack will result in $120 million in lost output and 1,137 lost jobs. By 2050, these numbers rise to $160.4 - $392.3 million in lost output and 1,520 – 3,717 lost jobs.[45] Higher temperatures and

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[43] Utah House Bill 66 (2020). Lines 131 – 133.

[44] Governor's Water Strategy Advisory Team. (2017, July). Recommended State Water Strategy. http://conserveswu.org/wp-content/uploads/Water-Strategy-FINAL-7.14.17.pdf.

[45] Lazar, B. (2009, September 29). Climate Change in Park City: An Assessment of Climate, Snowpack, and Economic Impacts. *Prepared for the Park City Foundation by Stratus Consulting.* https://collections.lib.utah.edu/ark:/87278/s67m365r.

droughts will impact agricultural production, and National Weather Service hydrologists in Salt Lake City expect that a warming climate will decrease the productivity of Utah agriculture.[46] Climate change is increasing the frequency and severity of significant weather events. 2019 is the sixth consecutive year in which 10 or more billion-dollar weather and climate disaster events have impacted the United States; over the last 41 years, there are only four other years with as many billion-dollar weather and climate disaster events.[47]

Q. How do you propose that the Commission account for the costs and risks of climate when determining the Export Credit value?

A. The Export Credit value should account for both the benefits of avoiding future carbon regulation and the significant benefits of avoiding the health and well-being impacts of climate change to Utahns. I support inclusion of the health benefits and societal benefits of reduced carbon emissions Dr. Berry has proposed (Dr Berry direct, lines 651 – 676 and lines 761 – 763). I recognize that the Commission may find it challenging to account for the societal and health benefits of reduced carbon emissions in the Export Credit value. There is overwhelming scientific evidence about the severe impacts that are likely to result if carbon emissions are not reduced, and there is also a wide range of future costs associated with those impacts. I suggest that the severity of the impacts of carbon emissions also warrants consideration in the design of the Export Credit rate.

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[46] Boal, J. (2019, September 17) State hydrologist warns of economic, environmental impacts of climate change. *KSL.* https://www.ksl.com/article/46639676/state-hydrologist-warns-of-economic-environmental-impacts-of-climate-change.

[47] NOAA National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters (2020). https://www.ncdc.noaa.gov/billions/, DOI: 10.25921/stkw-7w7.

Through the rate design process, the Commission may balance the science of determining precise cost and benefit quantification with the art of designing a rate that is in the best interest of the future well-being of Utah. In Section IV, I make recommendations for determining such a rate.

Q. Please summarize your recommendations in response to Vote Solar's testimony.

A. I support consideration of the categories of costs and benefits identified by Vote Solar for the purposes of determining the Export Credit value. I recommend that the Commission create a placeholder for the benefits of grid support services and reliability and resilience so that these benefits can be quantified in the future. Finally, I recommend that the Export Credit include consideration of the benefits of carbon-free resources, including carbon compliance costs, avoided health impacts, and the societal benefits of reduced carbon emissions, in the Export Credit rate.

IV. EXPORT CREDIT RATE DESIGN

Q. Why have you chosen to separate your response to parties' rate design proposals from your response to parties' components of cost and benefit?

A. As outlined in my direct testimony, the Export Credit value, rate design, and implementation will all determine the trajectory of growth for rooftop solar and other DER technologies that are commonly paired with rooftop solar in Utah. I respond to other parties' recommendations related to rate design separately from their recommendations related to the determination of an Export Credit value because these are separate but related questions. An Export Credit value that undervalues energy exports will not result in an optimal level of rooftop solar installations. However, a fair value for the Export Credit will still stifle the growth of rooftop solar if the Export

Credit rate design is not simple and comprehensible to customers, or if it does not provide a reasonable level of stability and certainty about the future.

<u>The Company's proposal to update the Export Credit rate annually saddles rooftop solar customers with unreasonable uncertainty and risk that will stifle the market for distributed energy resources in Utah.</u>

Q. The Company proposes to update Export Credit rates annually by April 30th each year, with updated prices effective July 1. How do you respond?

A. If rates are updated annually then solar customers will have virtually no certainty regarding the value of an investment in rooftop solar. One of Bonbright's criteria for a desirable rate structure is to provide "stability of the rates themselves, with a minimum of unexpected changes seriously averse to existing customers."[48] If rates are updated annually, solar customers will be unable to make realistic assumptions about their anticipated savings over the lifetime of the panels, and are unlikely to make the significant upfront investment to purchase solar panels in the first place. As an illustrative (and simplified) example, a solar customer who installs a 6 kW system in 2021 who receives a 9.2 cent/kWh credit (as is the case with the Transition Program) can expect to save approximately $875 on their utility bill in the first year, but cannot know how much they might save in subsequent years. Few customers will make an investment in a system that costs over $17,000 before tax credits ($12,500 after tax credits)[49] with a known savings of only $875.[50]

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[48] Bonbright, J. (1961). Principles of Public Utility Rates. Columbia University Press. p 291.
[49] Federal tax credits expire in 2022 and Utah state tax credits expire in 2024.
[50] Based on a cost for solar of $2.87/kWh, the national average price for residential solar in 2019 according to the Solar Energy Industries Association. https://www.seia.org/solar-industry-research-data.

Q. How would customers who finance their systems be affected by a rate that updates annually?

A. When customers finance the purchase of solar panels, they evaluate the monthly cost of their financing arrangement relative to the anticipated savings on their utility bill. Solar financing terms range from 10 – 25 years, and more than half of Utah solar customers may use financing.[51] If the Export Credit value changes annually, a significant number of rooftop solar customers may find themselves underwater on their solar investment in the future. A compensation rate that changes regularly severely limits the ability to finance solar systems, which limits distributed solar to only the wealthiest customers that can pay for their systems without financing.

Q. Has the Commission previously addressed the question of striking an appropriate balance between providing the certainty necessary to make a private investment in a solar resource while also protecting ratepayers?

A. Yes, in Docket No. 15-035-53 the Commission considered a similar question pertaining to Qualifying Facilities. In that proceeding, the Commission determined that "a 15-year term strikes the appropriate balance at this time by mitigating a fair portion of the fixed-price risk ratepayers would otherwise bear while allowing QF developers and their financiers a reasonable opportunity to adjust to this more modest change in business practice."[52]

Q. What do you propose as an alternative?

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[51] Solar Energy Industries Association. Solar Power Purchase Agreements. https://www.seia.org/research-resources/solar-power-purchase-agreements.

[52] Docket No. 15-035-53, Order, January 7, 2016.

A. I recommend that solar customers remain on the Export Credit value current on their date of their approved interconnection application for 20 years. This provides individual customers with the certainty necessary to make a long-term investment in rooftop solar equipment but doesn't prevent the adjustment of rates over time for future customers.

<u>Instantaneous netting is unreasonably complex and not actionable.</u>

Q. The Company proposes "no netting of energy." How do you respond?

A. The Company argues that instantaneous meeting "sends a price signal for customer generators to align their usage with their generation output" which benefits the Company and other customers "by accurately accounting for the load that the customers with generation draw from the system" (Mr. Meredith direct, lines 112 – 115). However, customers do not have the information to respond to instantaneous netting, and it is not aligned with the Bonbright rate design principle of "simplicity, understandability, public acceptability, and feasibility of application."[53] Customers do not receive real-time information about their energy usage, and according to the Company, billing for Schedule 137 will be accomplished based on "total quantities for the two different time of use periods (on-peak and off-peak) for delivered and received energy during the monthly billing cycle.[54] Without knowledge of how much energy they are using on an instantaneous basis, customers cannot predict how much solar generation they might use and how much will be exported, and cannot reasonably

[53] Bonbright, p 291.
[54] Exhibit O - OCS data request 7.2 to RMP.

estimate anticipated savings from rooftop solar or make decisions about energy usage to reduce their monthly utility costs.

Q. The Company also states that instantaneous netting "is a simpler concept to explain to customers than netting over each 15-minute interval." Do you agree?

A. Perhaps it is simpler to explain, but neither are actionable. To evaluate their energy usage, customers must consider it over some defined time period. As the Office explains in their direct testimony, "RMP indicates that exported energy will be measured in "real time" but clearly there is some level of time over which it will actually be measured" (Ms. Murray direct, lines 106 – 108). In practice, the meters the Company proposes to use will sample current and voltage signals and update the delivered and export registers every second.[55] This results in 3,600 records of both exported and delivered energy in every hour, or 86,400 records in a day. In contrast, there are 96 fifteen-minute periods in a day, and this netting construct is already challenging enough for customers to analyze even if they were provided the data to do so (which they do not).

Q. What do you recommend regarding the netting interval for the Export Credit?

A. I continue to recommend that the Export Credit rate should not be netted more frequently than hourly in order to ensure that it is simple and comprehensible to customers.

The Company's proposed effective date for the Export Credit rate will have severe adverse economic impacts.

[55] Exhibit O.

Q. How will the Company's proposal affect the value proposition for a solar installation in Utah?

A. It's impossible to accurately estimate the value proposition for a solar installation in Utah based on the Company's proposal, because customers do not currently have access to the instantaneous load data needed to estimate energy exports or their on-peak and off-peak usage. Based on the Company's proposed average annual Export Credit of 1.526 cent/kWh, a residential customer with average energy use can expect a payback of 20 – 25 years or more even with current Federal and state tax incentives. For low energy users, customers who aren't home during the day, and customers who don't have the tax appetite to take advantage of tax credits, an investment in solar may never pay itself off.

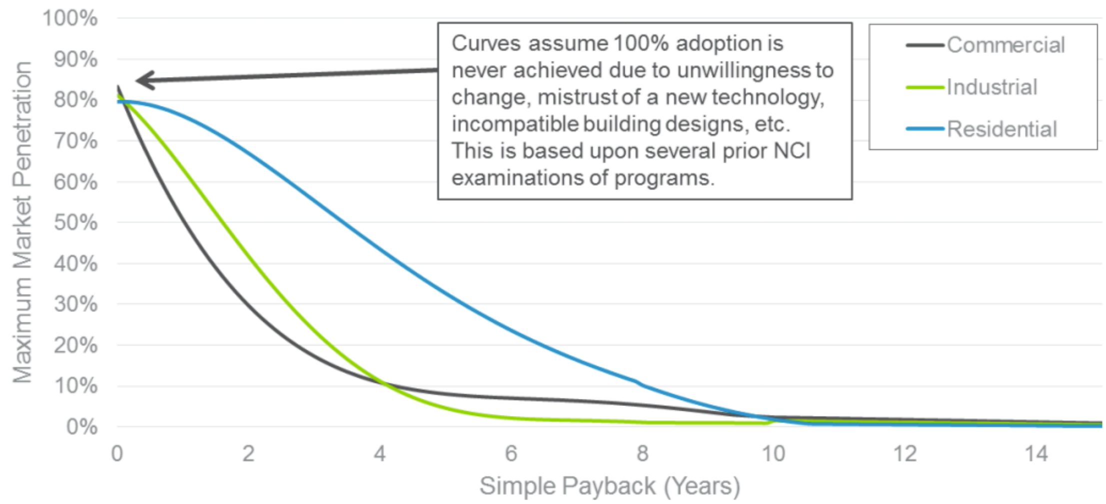
Q. What impact would the Company's proposal have on the market for rooftop solar in Utah?

A. The Company's proposed Export Credit value will halt the currently modest growth of Utah's solar market. Navigant's Private Generation Resource Assessment for 2019 - 2038, commissioned as an input to the IRP, evaluates the maximum market penetration of rooftop solar using Fisher-Pry market penetration curves. According to this analysis, a simple payback of 10 years or more results in a maximum market penetration that is almost zero. Current market penetration is slightly less than 2% (Bowman direct, line 216). In other words, if the Company's proposal is approved, it is reasonable to assume that future rooftop solar development will be extremely limited in Utah.

Figure 3. Payback Acceptance Curves from Navigant Private Generation Long-Term Resource Assessment (2019 – 2038)[56]

For private generation technologies, Navigant used the following payback acceptance curves to model market penetration of PG sources from the retail customer's perspective.

Figure 6 Payback Acceptance Curves



Source: Navigant Consulting based upon work for various utilities, federal government organizations, and state/local organizations. The curves were developed from customer surveys, mining of historical program data, and industry interviews.

Q. The Company proposes that Schedule 137 become effective January 1, 2021. How do you respond?

A. A sudden transition to a low Export Credit value will have severe impacts on the market for rooftop solar. Mr. Evans' testimony provides context to understand the economic impact: the transition from net metering to a credit that equals 90 – 92.5% of the average retail rate has resulted in the elimination of at least 600 jobs. (Mr. Evans direct, lines 56 – 79). An estimated 7,107 Utahns are employed in the solar energy

[56] Paidipati, J., Goffri, S., Romano, A., & Auker, R. (2018, August 15). Private Generation Long-Term Resource Assessment (2019 – 2038). *Prepared for PacifiCorp by Navigant Consulting.* https://www.pacificorp.com/content/dam/pcorp/documents/en/pacificorp/energy/integrated-resource-plan/2019_IRP_Volume_II_Appendices_M-R.pdf.

industry,[57] but it is difficult to imagine that many solar companies will remain in business if the Commission approves a policy that effectively halts solar market growth in the state.

Q. **When should the Transition Program be closed to new customers, and when should the Export Credit take effect?**

A. In the Settlement Stipulation, the Commission approved a capacity-based cap on the Transition Program. The Transition Program Cap is set at 170 megawatts for residential and small commercial customers (including Schedules No. 1, 2, 3, 15, and 23), and 70 megawatts for large commercial customers (including Schedules No. 6, 6A, 6B, 8, and 10.) The Company has been tracking and reporting progress towards the cap on a publicly accessible website, and provides updates on the cumulative capacity of rooftop solar systems that have been interconnected at the end of each month. All parties involved agreed that the Transition Program Cap was reasonable. If the Commission approves an Export Credit value that is lower than the current transition program rate, I recommend that the Commission maintain use of the Transition Program Cap and implement the new Export Credit program when the Transition Program Cap has been reached.

<u>A transition to a new Export Credit can be achieved without creating uncertainty and risk for future solar customers or severe impacts on businesses.</u>

Q. Do you agree with Vote Solar's proposal to return to net metering?

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[57] Solar Energy Industries Association. (2020, June 11). State Solar Spotlight - Utah. https://www.seia.org/sites/default/files/2020-06/Utah_9.pdf.

A. I do not oppose a return to net metering. Net metering is the simplest rate structure available for rooftop solar, and the most prevalent policy for rooftop solar customers across the country. Given the evidence that solar delivers value to the grid that is equal to or above the average retail rate for electricity for all customer classes, net metering is not unreasonable and further it is simple to administer. However, it is also possible to design a fair rate for rooftop solar using the construct of an Export Credit , as long as the full range of costs and benefits are considered in the valuation of the Export Credit .

Q. What do you propose for the implementation of a new Export Credit rate?

A. If the Commission approves a value for the Export Credit value that is less than the Transition Program rate, I propose that the final approved value be considered the "floor value" of the Export Credit. I further recommend that the Commission approve a glide path for phasing in the floor value incrementally, specifying capacity caps for each tier of the phase-in.

Q. Please describe your proposed glide path.

A. The glide path for a gradual transition to the new Export Credit rate ultimately depends on the final value of the Export Credit. The greater the difference between the floor value of the Export Credit and the Transition Program rates, the longer the glide path should be. If the Commission does adopt an Export Credit value that is substantially different from the Transition Program value, then I propose the following glide path for implementation of the new rate:

Figure 4. Proposed Export Credit Implementation Glide Path

Export Credit Value (% of average retail rate)	**Total Capacity Available**
90% for schedules 1, 2, and 3; 92.5% for all other schedules	240 MW (170 MW res./small comm. & 70 MW large comm.)

(current Transition Program rate)	
85%	80 MW
80%	80 MW

Etc. until final value of Export Credit is reached.

Q. Are there other states that have used a similar glide path?

A. Yes, our neighbor to the west, Nevada, has adopted a tiered rate structure for net metering systems that decreases over time. This tiered rate structure applies to customers of NV Energy, a Berkshire-Hathaway Company serving 1.3 million customers in Nevada.

Q. Please describe the rooftop solar rate structure in Nevada.

A. As shown in Figure 5, Nevada's net metering rate structure provides a credit for solar energy exported to the grid that is equal to a percentage of the retail rate. The value of the credit began at 95% of the retail rate (Tier 1), and gradually steps down to 88% (Tier 2), 81% (Tier 3), and then 75% (Tier 4) of the retail rate. Each rate is available until 80 megawatts of capacity has been installed through that tier. As of July 9, 2020, the effective solar export credit in Nevada equals 81% of the retail rate, and roughly 63 megawatts of capacity have been installed in this tier.[2]

Figure 5. Net Metering Rates in Nevada[58]

Net Metering in Nevada

Last Updated: July 9, 2020

Tier 4		
Applied Capacity 6.440 MW*	Installed Capacity 0.000 MW*	Total Capacity 6.440 MW*
Tier 3		
Applied Capacity 17.189 MW*	Installed Capacity 62.819 MW*	Total Capacity 80.008 MW*
Tier 2		
Applied Capacity 1.992 MW*	Installed Capacity 78.013 MW*	Total Capacity 80.005 MW*
Tier 1 - CLOSED		
Applied Capacity 0.000 MW*	Installed Capacity 79.578 MW*	Total Capacity 79.578 MW*

Q. What if the final, Commission-approved value of the Export Credit rate is similar to or equal to the current Transition Program rate?

A. In that case, a glide path may not be necessary.

Q. Are there other benefits to the glide path you have proposed?

A. Yes, this gradual phase-in schedule allows the Commission and other stakeholders to regularly monitor the impact of each rate tier and consider additional changes to the glide path in the future if necessary.

Q. How do you propose that the transition to each new rate tier is implemented?

[58] State of Nevada Public Utilities Commission. Net Metering in Nevada. http://puc.nv.gov/Renewable_Energy/Net_Metering/.

A. I recommend that the Commission approve a process that is modeled after the phase out of the Federal Electric Vehicle (EV) Tax Credit.

Q. What is the Federal EV Tax Credit, and how does it phase out?

A. The Federal EV Tax Credit provides an incentive of up to $7,500 for the purchase of an electric vehicle, and begins to phase down when the credit has been claimed for 200,000 cars made by a given manufacturer. The credit begins to phase out for a given manufacturer in the second quarter following the calendar quarter in which the 200,000th electric vehicle is sold. This schedule ensures that customers and dealerships have time to receive notice of the change in the tax credit value before choosing to purchase a vehicle.

Q. How could a similar transition apply to rooftop solar?

A. I propose that each rate tier becomes effective three months following the calendar date on which when the total installed capacity for a given rate tier reaches 80 MW. This structure will help avoid a situation where a customer pays to submit their interconnection application because they are not aware that the capacity cap was reached at 4:00 PM the day before, for example.

V. SUMMARY OF RECOMMENDATIONS

Q. Please summarize your recommendations.

A. In response to the direct testimonies of other parties in this Docket, I provide the following recommendations related to the value of the Export Credit:

- I recommend that the Commission reject the Company's proposed Export Credit value because it does not address many of the quantifiable benefits of exported distributed energy.

- Avoided energy costs should be determined using hourly forward-looking projections of energy costs and data that is accessible to stakeholders, and not GRID, and I support Vote Solar's proposed value for avoided energy costs.
- I recommend that the Commission include a value for the capacity benefits of aggregated distributed energy exports in the Export Credit, and I support the values proposed by Vote Solar and Vivint Solar.
- The Commission should not limit evaluation of the Export Credit value to the factors considered in the Proxy/PDDRR methodology, which is designed for QFs and does not account for the benefits of distributed energy resources.
- The issue of grid impacts from distributed energy resources and opportunities to maximize the benefits of these resources should be explored through a transparent Integrated Distribution System Planning process.
- I recommend that the Commission create placeholders for grid support services and for reliability and resilience so that these benefits can be quantified in the future.
- The Export Credit should include the benefits of carbon-free resources, including carbon compliance costs, avoided health impacts, and the societal benefits of reduced carbon emissions, and I support Vote Solar's proposed values for these benefits.

I provide the following recommendations regarding the rate design for the Export Credit:

- Solar customers should remain on the Export Credit value current on their date of interconnection for 20 years.
- I recommend that the Transition Program rate be maintained until the Transition Program Cap has been reached.
- The Export Credit rate should not be netted more frequently than hourly in order to ensure that it is comprehensible and actionable.
- Based on the evidence of the significant benefits provided by distributed solar, I do not oppose a return to net metering, as proposed by Vote Solar.
- Should the Commission approve a value for the Export Credit that is less than the Transition Program value, I recommend a proposal for achieving a gradual transition to a lower Export Credit rate.

Q. Does that conclude your rebuttal?

A. Yes.