**ENVIRONMENTAL LAW & POLICY CENTER**
Protecting the Midwest's Environment and Natural Heritage

September 30, 2013

Dr. Burl Haar
Executive Secretary
Minnesota Public Utilities Commission
121 7th Place East, Suite 350
St. Paul, MN 55101-2147

**VIA ELECTRONIC SERVICE**

*Re: In In the Matter of the Petition of Northern States Power Company for Approval of Tariff Modifications Implementing Net Metered Facility Provisions, Standby Service Exemptions, and Meter Aggregation Pursuant to the 2013 Omnibus Energy Bill*
*PUC Docket No. E002/M-13-642*

Dear Dr. Haar:

Enclosed herewith in connection with the above matter please find the Comments of the Alliance for Solar Choice, Environmental Law & Policy Center, Fresh Energy, Institute for Local Self Reliance, Interstate Renewable Energy Council, Inc. and Vote Solar Initiative.

Sincerely,

Allen Gleckner
Staff Attorney

Enclosure

cc: Attached Service list

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| In the Matter of the Petition of Northern States Power Company for Approval of Tariff Modifications Implementing Net Metered Facility Provisions, Standby Service Exemptions, and Meter Aggregation Pursuant to the 2013 Omnibus Energy Bill | Docket No.: E002/M-13-642 |

**COMMENTS OF THE ALLIANCE FOR SOLAR CHOICE, ENVIRONMENTAL LAW & POLICY CENTER, FRESH ENERGY, INSTITUTE FOR LOCAL SELF RELIANCE, INTERSTATE RENEWABLE ENERGY COUNCIL, INC. AND VOTE SOLAR INITIATIVE**

The Alliance for Solar Choice, Environmental Law & Policy Center, Fresh Energy, Institute for Local Self Reliance, Interstate Renewable Energy Council, Inc. ("IREC") and Vote Solar Initiative ("Distributed Renewables Advocates"), hereby submit comments on Northern States Power Company's ("Xcel") proposed Net Metered Facility tariff modifications to comply with the 2013 Solar Energy Jobs Act.

**Background and Context**

Minnesota first implemented its net metering policy in 1981, making it one of the first states to adopt net energy metering ("NEM"). NEM is a state-level policy that creates consistent regulatory standards and predictable financial parameters for self-generation at the retail level. It does this by creating a standard NEM tariff that establishes a fair and predictable ongoing relationship between utilities and customer-generators.

As set forth in Minn. Stat. 216B.164 Subd. 1, the statutory intent of Minnesota's NEM policy is:

> "…to give the maximum possible encouragement to cogeneration and small power production consistent with protection of the ratepayers and the public."

Minnesota's evident legislative intent in expanding the availability of the NEM tariff to systems up to 1,000 kilowatts ("kW") was to make NEM more broadly available to Minnesota property owners and energy consumers across the IOU service territories. The other changes to NEM in the Solar Energy Jobs

Act are also based on the premise that NEM is a beneficial policy and, therefore, that more customers should have effective access to NEM.

Xcel's proposed amendments to its NEM tariff include technical amendments called for by the statute:

- Increasing the NEM system size limit to 1,000 kW.
- Adding a provision for net-excess generation bill credit and year-end "Energy Payment" for NEM systems between 40 kW and 1,000 kW.
- Removing mandatory standby charges for systems up to 100 kW.
- Adding provisions to allow for meter aggregation.

The proposed amendments also include changes to the tariff and the standard Contract for Net-Metered Facilities that were not called for by the statute:

- Adding a provision to the tariff and contract language that grants full ownership of all Renewable Energy Credits ("RECs") from all electricity generated by customer-sited NEM systems without compensation.
- Increasing the Metering Charge for customer's NEM systems larger than 40kW.
- Allowing NEM customer-generators to opt into Xcel's standby service tariff (*e.g.*, in order to receive a capacity-value credit for the system, which is not otherwise available through NEM).
- Adding tariff language that excludes third-party owned distributed-generation systems.

Distributed Renewables Advocates respectfully submit that the Commission should not approve Xcel's proposed modifications that do not relate to required changes stemming from the 2013 Solar Energy Jobs Act. The following sections of the tariff should either be rejected or more thoroughly reviewed:

1. The Commission should reject Xcel's proposed change to REC ownership and assignment, under which the ownership of RECs created by NEM generators would automatically vest in Xcel without any direct compensation to the generator as a part of the standard NEM contract.
2. The Commission should order Xcel to provide information about the calculation of its "Energy Payment" and require Xcel to update the rate after the Value of Solar Tariff ("VOST") process is complete
3. The Commission should reject Xcel's discriminatory new meter charge.
4. The Commission should reject Xcel's attempts to explicitly or implicitly exclude third-party owners from NEM eligibility.
5. The Commission should reject Xcel's proposed approach for allowing net-metered customers to receive credit for the capacity value they provide to the utility.
6. The Commission should require Xcel to adopt project size determination practices consistent with statutory language in the Solar Energy Jobs Act.

7. As part of its NEM tariff, the Commission should require Xcel to also revise and clarify its Standby Service tariff.
8. The Commission should clarify that Xcel must show that any future meter aggregation charge is reasonable and cost-justified, and must receive Commission approval prior to charging customers.
9. Finally, either in this docket or the up-coming VOST docket, the Commission should clarify the relationship between NEM and a potential VOST.

The common theme with the above concerns is to remove elements of the proposed NEM tariff that unnecessarily increase customer-side cost, complexity, uncertainty or risk. Minimizing these regulatory barriers to the adoption of distributed solar is key to realizing the intent behind the NEM changes in the Solar Energy and Jobs Bill – to enable more access to distributed renewable NEM.

**1. The Commission Should Reject Xcel's Proposed Change To Net-Metering REC Ownership and Assignment.**

The Commission should reject Xcel's proposed change to net-metering REC ownership because the change is not required by the 2013 energy legislation or Commission Order, would result in Minnesota ignoring the best practice followed in most states and could constrain other 2013 energy legislation implementation processes. To the contrary, the legislature did explicitly allow for the transfer of solar RECs ("sRECs") under the VOST, raising a negative inference as to transfer of the sRECs under NEM since the legislation is silent on the subject. Adopting Xcel's proposed change that ignores best practices would signal that Minnesota is unfriendly to privately financed, customer-sited rooftop solar, which is contrary to the legislature's intent in passing the 2013 Solar Energy Jobs Act. Instead, the Commission should affirm that Minnesota follows best practices by ordering that RECs are owned by the renewable generator unless the generator receives fair compensation.

As a starting point, it is worth noting that Xcel's filing inherently acknowledges that the initial ownership of RECs vests with the owner of the generation equipment that generated said RECs. First, in section 12.C., Xcel characterizes the vesting of REC ownership with the utility as an assignment from the generator: "By participating as a Customer under this Contract" (should read 'generator' or 'generation owner'), "the Customer hereby *assigns* to the Company all right title and interest to all the RECs arising . . ." (emphasis added). Second, the same section invokes agency theory in justifying the REC transfer from generator to utility. This implies that the generator has a direct economic interest in the RECs generated, otherwise there would be no obvious basis for agency. Therefore, Xcel is not claiming that it initially owns the RECs generated from a NEM system, but is proposing that these RECs should automatically transfer to Xcel without compensation to the NEM generator. There is no compelling reason why changes to net-metering REC ownership should be made now in this filing. Xcel's proposed change is not a basic tariff amendment required by the Solar Energy Jobs Act, as that legislation did not address REC ownership for NEM facilities. Further, public record does not indicate this proposed change was requested by the Commission. Instead, Xcel is attempting to make this significant change in a proceeding with limited public participation.

In addition, Xcel's proposed change to REC ownership is contrary to net-metering best practices followed by the vast majority of other states that have addressed the issue. IREC's net-metering best practice for REC ownership and compensation states that "[a] customer-generator owns the [RECs] associated with the electricity it generates, unless such RECs were explicitly contracted for through a separate transaction independent of any Net Metering or interconnection tariff or contract."[1] The vast majority of states that have explicitly addressed the issue have adopted the best practices embodied in IREC's model net metering rules. Out of the 25 states and Washington, DC that have addressed the issue, 21 follow the best practice and only four (Kansas, New Mexico, North Carolina and South Carolina) automatically transfer RECs to the utility through a net-metering contract.[2] There is no reason for Minnesota to differ from best practices. Doing so would send a negative signal to customers seeking to install distributed renewable generation and to the renewables industry hoping to expand in Minnesota as a result of the new energy legislation.

The concept underlying the best practice is that RECs should transfer to the utility only when it compensates the initial REC owner for the RECs generated by his/her system, either through an incentive or specific compensation for the REC in a contract, because the renewable energy attributes are a valuable component of the total value created by the customer's investment in a renewable energy system. Accordingly, a utility should not be allowed to transfer this value absent compensation. On the other hand, when the utility offers a solar rebate program or similar incentive, the incentive serves as compensation to the generator for the RECs. Indeed, many states transfer RECs to utilities in order to comply with Renewable Energy Standards ("RES") as part of utility incentive programs for solar and other renewables that are offered to help the utility meet RES requirements.

In this case, RECs should not transfer automatically as part of a net-metering contract because net-metering alone is not an incentive. No study has been done in Minnesota to determine the full costs and benefits of net-metering, and Xcel has not demonstrated in this filing or elsewhere that net-metering is a net cost to the system and therefore constitutes an incentive.[3] Minnesota will be explicitly examining the costs and benefit of distributed solar in the VOST process. REC ownership and compensation will very likely be a direct component of the value being considered by parties. Therefore, the VOST process

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[1] IREC Model Net-Metering Rules 2009, para. 11.

[2] IREC Net Metering Policy Comparison, updated 8-23-13. The following states follow best practices for net-metering REC ownership and compensation: Arizona, California, Delaware, Washington, D.C., Florida, Idaho, Illinois, Kentucky, Maryland, Massachusetts, Michigan, Nebraska, Nevada, New Hampshire, North Dakota, Oregon, Pennsylvania, Utah, Virginia and Washington. (IREC, Policy Comparison: State and Utility Net Metering Rules for Distributed Generation, updated 8-23-13, www.irecusa.org/regulatory-reform/net-metering/policy-comparison/). The following states do not follow best practices: Kansas, New Mexico, North Carolina and South Carolina. (*Id.*). North Dakota is considered to follow best practices because "[c]ustomers retain ownership of renewable-energy credits (RECs) associated with the customer's load, while RECs associated with NEG convey to the utility (with compensation to the customer-generator)." (Database of State Incentives for Renewables and Efficiency, *North Dakota*, http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=ND01R&re=0&ee=0 ). South Carolina is not as "Customer owns RECs until REC market emerges, at which point utilities will own RECs." (Database of State Incentives for Renewables and Efficiency, *South Carolina*, http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=SC12R&re=0&ee=0 (same for all SC utilities with NEM via PUC order).

[3] In fact, a number of cost/benefit studies from other states have shown net-metered solar to be a net-benefit to utility systems. (*A Review of Solar PV Benefit & Cost Studies,* Rocky Mountain Institute, April 2013). While a few studies have found net-metered solar to be a net cost, at the very least, the analysis so far shows that one cannot simply assume that net-metering is an incentive. Indeed, Rocky Mountain Institute's review of the major cost/benefit studies to date found that "There is a significant range of estimated value across studies, driven primarily by differences in local context, input assumptions, and methodological approaches." (*Id.* at 22).

will not only inform a decision on this issue, but could be unnecessarily constrained by a decision limiting the value of RECs to customers and small generators in this proceeding.

In addition, REC ownership and compensation has significant economic implications for other 2013 Energy Legislation implementation processes that are on-going, or will be taking place in the near future:

- *Community Solar Gardens*. REC ownership and compensation is also at issue as part of Xcel's Community Solar Gardens ("CSGs") program. The statute is similarly silent on the issue for CSGs and stakeholders are in the process of determining the proper REC flow and compensation in the CSG context.
- *Value of Solar Tariff*. REC value to Xcel and the proper REC compensation is a component of the Value of Solar Tariff ("VOST"), which the Department of Commerce and stakeholder will be fleshing out in this Fall's methodology process. This process and the Department's work with Clean Power Research to evaluate costs and benefits of distributed solar to Xcel's system will lead to a better understanding of how RECs should flow and how customers should be compensated for their RECs.
- *Production Incentive*. The statutory language for the Solar Energy Incentive Program for systems 20 kWs and smaller is similarly silent on REC ownership and will have to be determined as part of the program's design and Commission approval.

The connections with other implementation processes demonstrate the importance and potentially far-reaching effects of a decision on REC ownership and compensation. If Xcel's proposed REC ownership structure is adopted and applied in these programs, it would seriously damage the economics for privately-financed customer-sited solar systems, which could not have been what the legislature intended when it created these new programs to expand solar in the state and make solar *more* economically viable. At the very least, these other stakeholder processes should not be constrained by a potentially precedential Miscellaneous Tariff filing in which there has been only a limited opportunity for public participation. Moreover, treatment of RECs is an issue affecting all Minnesota NEM contracts, not just those in Xcel's service territory. NEM REC treatment should be consistent across utilities.

Finally, another consequence of Xcel's REC ownership proposal is that it would prevent businesses and other parties from using their RECs for non-RPS compliance purposes. As the Vote Solar Initiative testified to the Arizona Corporation Commission this year:

> There are two markets for RECs. The first is the compliance market, in which RECs are used by a utility or other energy provider to comply with a state renewable requirement. The second market is a non-compliance (sometimes known as voluntary) market in which individuals, businesses or local governments acquire RECs to achieve certain sustainability or climate change goals. There are many companies[4] operating at the national, regional and state level that acquire and aggregate RECs from individual projects for resale to individuals and organizations. One of the largest, Bonneville Environmental Foundation (BEF), defines RECs as follows:

[4] *See* http://www.green-e.org/base/re_products#res

> A **Renewable Energy Certificate**, or REC, is a tradable, legal mechanism that represents the environmental benefits associated with one megawatt-hour of electricity generated from a renewable energy resource. These certificates may be sold and traded and the owner of the REC can legally claim to have purchased renewable energy. RECs incentivize the production of renewable energy by providing a source of revenue to electricity generated from renewable sources.[5]

In some cases, the ability for a company or individual to use their RECs for a non-compliance purposes can be a significant factor driving a distributed solar (or other renewable) project. Xcel's proposed REC ownership would completely foreclose this option.

The Commission should reject Xcel's proposed change to NEM REC ownership because the change is not required by the 2013 energy legislation or Commission Order, would constrain other 2013 legislative requirements and would result in Minnesota ignoring the best practice followed in most states, hampering the progress of distributed renewables in Minnesota. In so doing, the Commission should reaffirm that RECs are owned by the customer-generator unless the generator is fairly compensated. If the Commission is not prepared to officially adopt best practices, it should still reject Xcel's proposal and take the issue up in a separate docket that will allow for more public participation and holistic analysis.

**2. Xcel Should Provide More Information About Its Net-Excess Generation Payment And Update The Rate Based On The VOST Process.**

Xcel's proposed tariff filing also includes an updated rate for its "Energy Payment" that will be paid to net-metering customers for year-end "remaining kilowatt-hour credits reflecting net input supplied by the customer."[6] This energy payment rate for net-excess generation is presumably based on the avoided-cost of that energy to Xcel's system. However, Xcel provides no explanation for how this rate was calculated or the value factors included in the calculation. Distributed Renewables Advocates are concerned that the rate seems low, but are unable to make this determination without more information. The VOST process will address the avoided costs of distributed solar for Xcel's system, so this detailed analysis could be used to inform the avoided-cost rate paid under the net-metering tariff as well. Therefore, we respectfully request that the Commission require Xcel to provide information about how it calculated this rate and require Xcel to update the rate once the VOST process has been completed.

**3. The Commission Should Reject Xcel's Discriminatory Increased Meter Charge.**

Xcel proposes to increase meter charges for net-metered systems in the 40kW to 1000kW range (the range explicitly expanded in the Omnibus Energy Bill) from $3.15 (single phase) and $6.40 (three phase) to $5.50 and $8.00, respectively.[7] The Commission should reject this increase as there is no legal requirement under the new Energy Bill to increase metering charges and no indication that increasing the net-metering size limit would increase meter charges. Moreover, the proposed increased meter charges are discriminatory, which is contrary to Minnesota law, FERC regulations and recognized best practices.

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[5] Testimony of Rick Gilliam on Behalf of the Vote Solar Initiative, Arizona Corporation Commission Dockets E-013458-10-0394, E-01345A-12-0290, E-Ol933A-12-0296, E-04204A-12-0297 (April 24, 2013) included as Attachment 1.

[6] Xcel Filing, Attachment B, p. 8.

[7] Xcel Filing, Attachment B, p. 5, 8.

As there is no direction in the Energy Bill for increased meter charges, the Commission should not allow Xcel to increase these charges with no explanation and no cost justification. Such justification is necessary because based on current production meter costs, it is very likely that Xcel will collect far more than the cost of installation and O&M from net-metered customer-generators over the life of the solar energy systems, assuming a net metered customer would pay this monthly meter charge for 20 to 25 years. For example, a single-phase meter would cost $66 per year, or approximately $1,300 over 20 years (assuming no increase in metering charge over time). That amount seems out-of-scale with installation and O&M charges. In the unlikely event that Xcel provides reasonable cost justifications for the increased and different rates, these costs should be addressed in the context of a rate case, not in a Miscellaneous Filing for technical updates to the net-metering tariff.

As proposed, the increased metering charges for systems between 40 kW and 1000 kW are also discriminatory because these charges are greater than the charges for systems below 40 kW. Xcel offers no explanation why larger systems' meters that are presumably the same will cost it more to install and maintain. Without explanation, these charges are discriminatory on their face, which is contrary to Minnesota law, FERC regulations, best practices and the intent of the new Solar Energy Jobs Act.

Minn. Stat. 216B.164(3)(c) requires that "[i]n setting rates, the commission shall consider the fixed distribution costs to the utility not otherwise accounted for in the basic monthly charge and shall ensure that the costs charged to the qualifying facility are not discriminatory in relation to the costs charged to other customers of the utility." Similarly, "FERC regulations provide that sales rates "shall not discriminate against any qualifying facility in comparison to rates for sales to other customers served by the electric utility."[8] Accordingly, in 2005 FERC struck down Pacific Gas & Electric's (PG&E's) standby retail rate design, finding it was unjust, unreasonable, and unduly discriminatory.[9] The Commission ordered PG&E to change its rates, terms and conditions and to make refunds as appropriate.[10] Therefore, the Commission should reject Xcel's proposed increased and discriminatory charge as contrary to Federal and state law. Moreover, increasing the meter charges on systems that are within the new Energy Bill's net-metering size limits undermines the legislation's clear intent to grow net-metered systems in this size range by increasing soft-costs on those systems. Finally, allowing discriminatory charges would, like the REC issue, set Minnesota apart from best practices, sending negative market signal.[11]

## 4. The Commission Should Reject Xcel's Attempts To Explicitly Or Implicitly Exclude Third-Party Owners From NEM Eligibility.

Xcel proposes to embed this NEM tariff within its Distributed Generation Standard Interconnection and Power Purchase Tariff. That is a different location than Xcel's existing (under 40 kW) NEM tariff, which is recorded under Xcel's Net Energy Billing Service rate code A50. A problem arises because the "availability" of Xcel's current Distributed Generation Standard Interconnection and

[8] 18 CFR § 292.305(a)(1)(ii).
[9] *Pacific Gas and Electric Company*, 110 FERC ¶ 63026, (February 9, 2005).
[10] *Id.*
[11] IREC Net-Metering Model Rules 2009, paras. 10, 12.

Power Purchase Tariff, as written, is limited to "retail electric customers."[12] As opposed to the existing NEM contract, which is available "to any small qualifying facility of less than 40 kW capacity."

Further, the proposed "Contract for Net-Metered Facilities" is structured as a contract between Xcel and "Customer."[13] As opposed to Xcel's existing NEM contract, under which Xcel consistently refers the generator as the "qualifying facility" or "QF", Xcel's present tariff consistently refers to "Customer". When it comes to tariffs, individual word choice can make a significant difference. The Commission should reject Xcel's proposed narrowing of entity types eligible for the new NEM contract as neither required under the new NEM statute, nor allowed under the pre-existing NEM statute. Minnesota's NEM law allows customers to generate electrical power and this right is not limited to customer-owned generation systems. Minn. Stat. § 216B.164 authorizes a "qualifying facility" to connect to utility facilities. Minnesota law does not define the term "qualifying facility," but as regards solar power systems, this term is defined by federal law in 18 C.F.R. §§ 292.203(a) and 292.204, which are incorporated into Minnesota law by reference.[14] This federal definition is not based on facility ownership, but rather relates strictly to facility size and generation type.[15] Minnesota law, in accordance with federal law, does not include facility ownership as a factor for determining eligibility for net metering.[16] Instead, the right to net meter accrues to a "qualifying facility" itself, and not to the owner of the facility.

If a facility qualifies under Minn. Stat. § 216B.164, then the utility customer who receives power from the qualifying facility is granted the right to non-discriminatory rates for energy supplied to it by the utility, as well as the right to be paid by the utility for net generation.[17] Nothing in the law requires that the "customer" own the facility that generates the power.

The statute's distinction between "qualifying facilities" and "customers" is important because it is evidence of an intent by the legislature to allow third-party ownership. If a facility qualifies for under Minn. Stat. § 216B.164 based solely on its size and type, then the rights to nondiscriminatory rates and payment for net generation accrue to the "customer" regardless of ownership. The state's net metering law simply does not include ownership as a factor to be used when determining whether a customer may self-generate and sell excess power to the grid. If the legislature intended to benefit only customer-owned facilities, it could have imposed this limitation, but it did not. Therefore, the PUC may not add such limitation into law.

Moreover, the state's net metering law also requires that it "shall at all times be construed in accordance with its intent to give the maximum possible encouragement to cogeneration and small power production consistent with protection of the ratepayers and the public."[18] Therefore, the PUC must interpret this law so as to allow development approaches that increase the use of solar power without threatening ratepayers or the public interest.

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[12] Proposed amendment to Minnesota Electric Rate Book, Sect.10, 2nd Revised Sheet No. 73 (date filed 07-13-13).
[13] *Id.* at Sect.10, Original Sheet No. 163.
[14] Minn. Stat. § 216B.164, Subd. 2.
[15] *Id*.
[16] Minn. Stat. § 216B.164.
[17] Minn. Stat. § 216B.164, Subd. 3.
[18] Minn. Stat. § 216B.164, Subd. 1.

In addition, Minnesota's distributed generation interconnection law recognizes the right of customers to self-generate electrical power and is not limited to customer-owned generation systems. Minnesota's distributed generation interconnection law allows customers to interconnect solar power systems.[19] Nothing in this law limits eligible facilities to only those owned by customers. Instead, the law's applicability is limited only by fuel type and generator capacity.[20] Although the law also requires approval of tariffs that establish standard interconnection agreements,[21] this language does not require that customers own the interconnected generation systems that serve them.

If ownership were important to accomplishing the goals of Minn. Stat. § 216.1611, the legislature would have included such restriction, but it did not do so. Moreover, the fact that the law states that one of its purposes is to "promote the use of distributed resources [including solar generation systems] in order to provide electric system benefits during periods of capacity constraints," indicates that the legislature seeks to promote solar power systems. Since third-party ownership in fact does "promote the use of distributed resources," it is in accordance with the overall legislative goal embodied in this law.

For these reasons, the Commission should prevent Xcel from limiting its proposed NEM tariff solely to "Customers," as this change is not required by the Solar Energy Jobs Act, and indeed is contrary to other statutes, and could prevent other solar and distributed renewable financing options where the system owner is not technically a retail customer.

## 5. The Commission Should Explore Alternatives To Xcel's Proposed Approach For Allowing NEM Customers To Receive Credit For The Capacity Value They Provide To The Utility.

Xcel's proposed tariff allows NEM customers to opt into Xcel's Standby Service tariff, thus allowing them to access the solar capacity credit component of its standby tariff. This may be an acceptable near-term approach for allowing distributed solar generators to receive fair compensation for the capacity value they provide to the utility, but it is not an optimal long-term approach. A fair capacity credit should be available to all energy technologies and system sizes eligible for NEM - including systems under 100 kW, which the Solar Energy Jobs Act specifically shelters from utility standby service fees. The most straightforward way to do this would be through a crediting mechanism in the NEM contract itself.

## 6. The Commission Should Require Xcel To Clarify Its NEM Contract Standby Charge Capacity Rating Language.

Under Xcel's proposed NEM contract, **"**Standby charges apply if the Net-Metered Facility System has an *AC nameplate capacity* of more than 100 kW. No standby charges apply if the Net-Metered Facility System has an AC nameplate capacity of 100 kW or less."[22] The Solar Energy Jobs Act statutory language states: '"Capacity' means the number of megawatts alternating current (AC) at the

[19] Minn. Stat. § 216B.1611.
[20] Minn. Stat. § 216B.1611, Subd. 2.
[21] *Id.*
[22] Xcel Filing, Attachment B, p. 14 (emphasis added).

point of interconnection between a distributed generation facility and a utility's electric system."[23] "AC Nameplate" is an unclear designation, as solar panel capacity is expressed in direct current. The Commission should require that Xcel clarify the nameplate capacity threshold over which standby charges will be applied.

**7. As Part Of Its NEM Tariff, The Commission Should Require Xcel To Also Revise And Clarify Its Standby Service Tariff.**

Xcel's proposed tariff proposes to begin applying a Standby Service tariff to all new NEM customer-generators sized between 100 kW and 1,000 kW in size and suggests that Xcel intends to use its current Standby Service tariff *without* amendment. The current Standby Service tariff is hard to understand, and the bill impact is very difficult to estimate in advance. Explicitly tying the NEM and Standby Service tariffs would thus frustrate the legislative intent behind NEM expansion, namely to make the NEM contract more broadly available to all Minnesota property owners and energy consumers across all IOU service territories.

As described in *Market Transformation Pathways for Grid-Connected Rooftop Solar PV in Minnesota*, a recently published policy report produced by Fresh Energy and CR Planning on behalf of the Minnesota Solar Challenge Program (funded primarily through a SunShot grant from the U.S. Department of Energy), "[o]nsite solar generation systems larger than 60 kilowatts are sometimes subject to 'standby' charges. The effect of such charges on a commercial customer's utility bill can be highly unpredictable, making it more difficult to develop project pro formas for onsite solar systems larger than 60 kilowatts."[24] The report, which is current as of April 2013, notes that (up until now) no Minnesota NEM customer-generators have ever been exposed to the complex, unpredictable standby tariff: "Net metered systems are not currently charged standby charges because the NEM capacity limit is below the 60-kilowatt standby threshold. (See June 2013 Addendum for legislative update.)."[25]

For these reasons, if Xcel plans to apply the Standby Service tariff to NEM customer-generators, then the Commission should require Xcel to amend its Standby Service tariff to clarify, simplify, and rationalize the tariff, in line with both the 2013 changes to the NEM statute and Xcel's proposed NEM tariff.

**8. The Commission Should Clarify That Xcel Must Show That Any Future Meter Aggregation Charge Is Reasonable And Receive Commission Approval Prior To Charging Customers.**

Xcel's proposed tariff includes a provision to allow a meter aggregation charge limited to administrative costs: "The Company may charge the Customer requesting to aggregate meters a reasonable fee to cover the administrative costs incurred in implementing the costs of this subdivision, pursuant to a tariff amendment approved by the commission for the Company."[26] Such a fee is allowed in the statute, but only after "the commission's prior approval" and "pursuant to a tariff approved by the

[23] MN Session Law, Chapter 85, HF 729, Article 9, Section 2, *available at* https://www.revisor.leg.state.mn.us/laws/?id=85&doctype=Chapter&year=2013&type=0
[24] Fresh Energy, *Market Transformation Pathways for Grid-Connected Rooftop Solar PV in Minnesota*, at 15-16 (2013).
[25] *Id.* at 28.
[26] Xcel Filing, Attachment B, p. 13.

commission for a public utility."[27] Since this proposed tariff does not include an actual fee, the Commission should clarify that any future meter aggregation charge must first be approved by the Commission and shown to be reasonably related to administrative costs.

## 9. The Commission Should Clarify The Relationship Between NEM And A Potential VOST, Now Or In Up-Coming VOST Proceedings.

Distributed Renewables Advocates also wish to bring the Commission's attention to a potential issue that will likely need clarification if Xcel continues to pursue a VOST. The Solar Energy Jobs Act provides that if Xcel offers a PUC-approved VOST, then it no longer required to offer the NEM tariff to solar customers (the proposed tariff improperly implies that NEM will be unavailable for all customers). Xcel includes this change in its proposed NEM tariff: "The provisions pertaining to [NEM] . . . will not apply to interconnections occurring after the Commission approves" a VOST.[28] However, the statute leaves the issue of what happens to existing NEM customers once a VOST is offered somewhat ambiguous. The most natural read of the statute is that existing NEM customers will be allowed to continue with the NEM contract, but will have the option of switching to the VOST. However, Xcel's proposed tariff is similarly vague on the status of exiting NEM contracts. While this issue does not need to be resolved immediately, we wanted to flag the issue for the Commission, as the relationship between NEM and VOST will need to be clarified before the VOST is in place, with the NEM tariff updated accordingly.

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The Distributed Renewables Advocates believe the above suggestions will allow Xcel to meet the Solar Energy Jobs Act's requirements without creating new regulatory and/or administrative barriers to distributed generation NEM and will result in more expansive and cost-effective distributed solar and other renewables.

Dated: September 30, 2013 Respectfully submitted,

[27] Minn. Stat. § 216B.164, Subd. 4a(e).
[28] Xcel Filing, Attachment B, p. 8.

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*On behalf of The Alliance for Solar Choice, Fresh Energy, Institute for Local Self Reliance, and Interstate Renewable Energy Council, Inc. and Vote Solar Initiative*

ATTACHMENT 1

# DIRECT TESTIMONY OF RICK GILLIAM

# ON BEHALF OF THE VOTE SOLAR INITIATIVE

**Docket No. E-013458-10-0394**
**Docket No. E-01345A-12-0290**
**Docket No. E-OI933A-12-0296**
**Docket No. E-04204A-12-0297**

April 24, 2013

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# The Vote Solar Initiative

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## RICK GILLIAM

**<u>Introduction and Overview</u>**

**Q. Please state your name and business address.**

A. My name is Rick Gilliam. My business address is 1120 Pearl Street, Suite 200 in Boulder, Colorado.

**Q. On whose behalf are you submitting this rebuttal testimony?**

A. This testimony is submitted on behalf of The Vote Solar Initiative ("Vote Solar").

**Q. By whom are you employed and in what capacity?**

A. I serve as Director of Research and Analysis for Vote Solar, and oversee policy initiatives, development, and implementation.

Vote Solar is a non-profit grassroots organization working to foster economic opportunity, promote energy independence and fight climate change by making solar a mainstream energy resource across the United States. Since 2002 Vote Solar has engaged in state, local and federal advocacy campaigns to remove regulatory barriers and implement key policies needed to bring solar to scale. We have nearly 2,500 Arizona members.

**Q. Please describe your experience in utility regulatory matters.**

A. Prior to joining Vote Solar in January of 2012, my regulatory experience included five years in the Government Affairs group at Sun Edison, one of the world's largest solar developers, twelve years at Public Service Company of Colorado as Director of Revenue Requirements and twelve years with Western Resource Advocates (WRA – formerly known as the Land and Water Fund of the Rockies) as Senior Policy Advisor. Prior to that, I spent six years with the Federal Energy Regulatory Commission. All told, I have in excess of 30 years of experience in utility regulatory matters. A summary of my background is attached as Appendix A.

**Q. Have you previously testified before the Arizona Corporation Commission ("ACC" or "Commission")?**

A. Yes. I testified before this Commission on behalf of Vote Solar in the recent Tucson Electric Power Rate Case, and on behalf of the LAW Fund in some of the early proceedings regarding the development of a renewable standard. I have also participated in a number of rulemakings in the intervening period.

**Q. Before what other utility regulatory commissions have you testified?**

A. I have testified in proceedings before the Public Utilities Commission of Colorado, Nevada Public Utilities Commission, the New Mexico Public Regulation Commission, the Utah Public Service Commission, the Wyoming Public Service Commission and the Federal Energy Regulatory Commission.

**Q. What is the purpose of your testimony?**

A. The purpose of my testimony is to respond to the direct testimony of APS witness Greg Bernosky and TEP witness Carmine Tilghman regarding the Companies' proposals to waive and then eliminate the distributed energy component of the Renewable Energy Standard, and to propose an alternative means of renewable energy credit ("REC") acquisition for compliance purposes.

**Q. Please summarize your testimony.**

A. This proceeding is very important in the evolution of the electric utility industry in Arizona. The major utilities are part way through the growing renewable energy compliance requirements, and certain technologies, notably photovoltaics or PV, are approaching an economic junction where direct financial incentives may be no longer needed to encourage homeowners and businesses to install solar generation on-site. Unfortunately, it is not a bright line.

As in most states with a customer-sited component in its renewable energy standard, utility compliance has been proven by the acquisition and retirement of sufficient RECs associated with customer-sited renewable electricity generation. Such RECs are acquired in exchange for incentive payments. If the economics of customer-sited solar deployment reach a point where retail customers are willing to install solar on their homes and businesses without financial incentives[1] from their utility, how can the utility acquire the RECs necessary to prove it is in compliance?

[1] It should be noted that some customers have already requested net metering service without receiving a utility incentive; see TEP witness Tilghman direct testimony, pages 4-5.

The utilities' answer is to waive the requirement in the near term, and eliminate it in the medium term. This approach solves the compliance problem by having nothing with which to comply, however it defeats the purpose of the renewable energy standard. Vote Solar's proposal is to leave intact the standard including A.A.C. R14-2-1805, the Distributed Renewable Energy Requirement, and find the lowest cost method for acquiring the credits needed for compliance.

**Q. Please characterize Vote Solar's interest in this proceeding.**

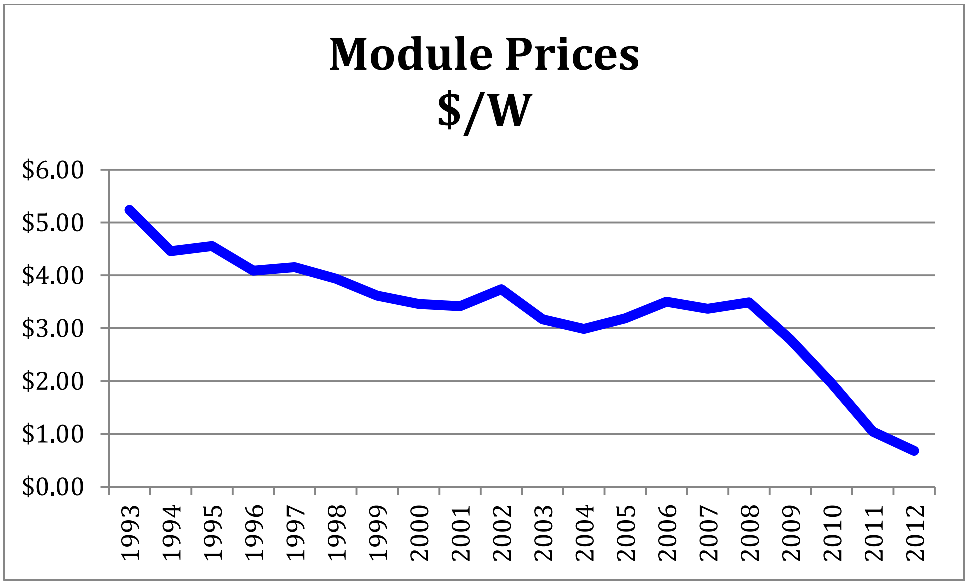
A. Vote Solar is interested in this proceeding because we view Arizona as one of the first major solar markets in which solar electricity prices are approaching the price of grid-supplied electricity. Continuation of current trends could lead to a point where incentives are no longer needed, all else being equal. These parity economics are highly dependent on a number of factors, not the least of which is the outcome of the APS technical conference process addressing net metering. This docket will address a number of proposals for supporting continuation of a strong stand-alone solar market. It is these trends and changes and the associated debate that interest Vote Solar.

## Background

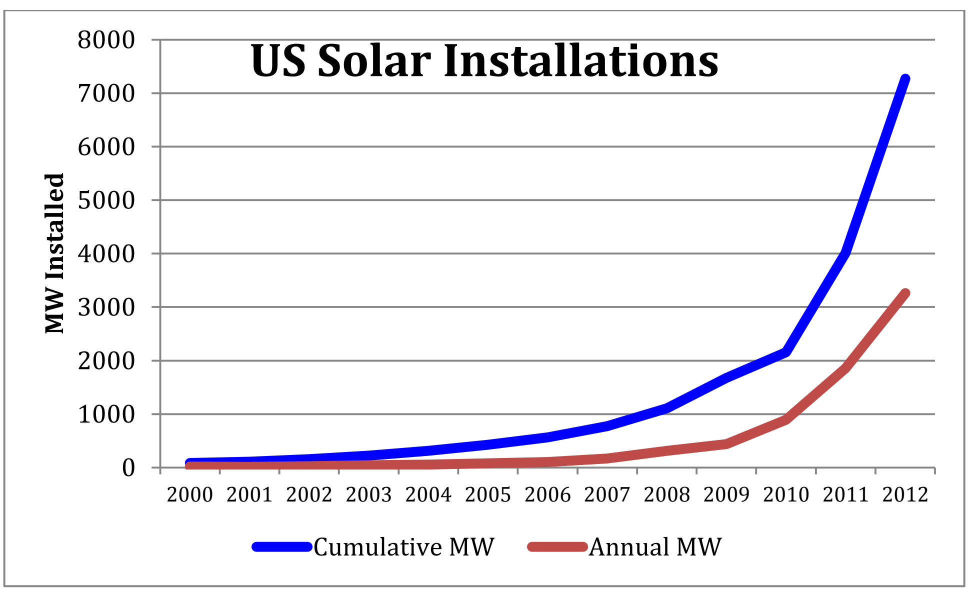
**Q. How did the need for this proceeding come about?**

A. This proceeding is a reflection of the success of the solar industry. The cost of solar has come down dramatically since the Renewable Energy Standard and

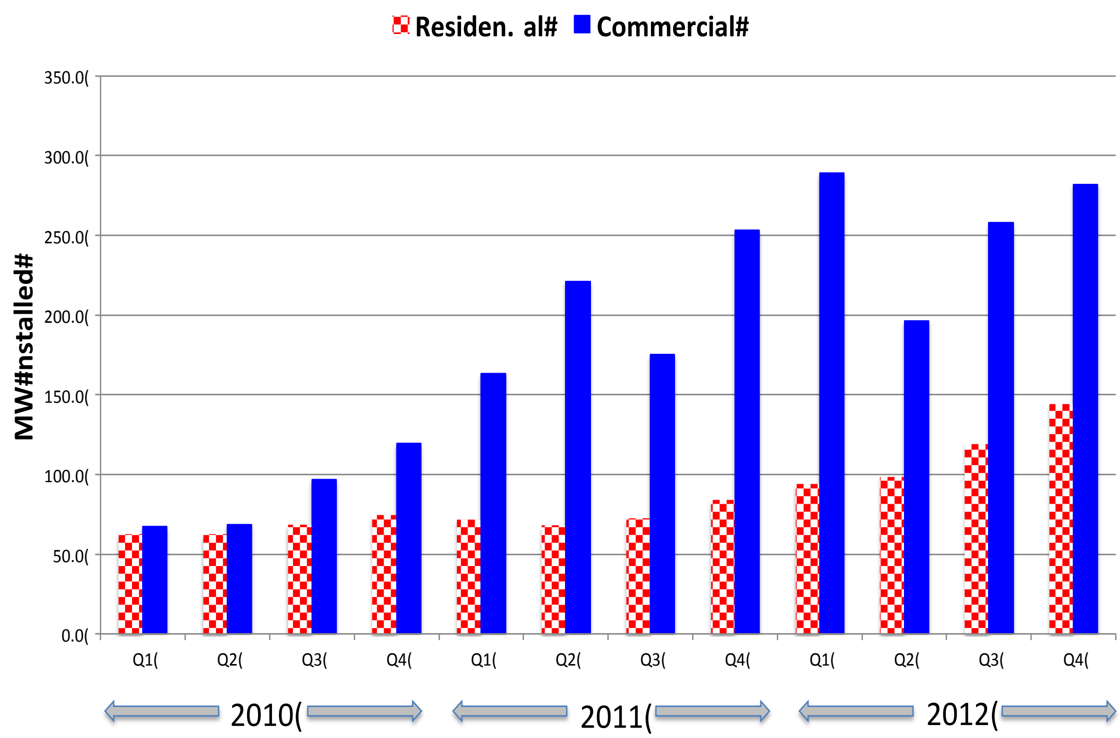
Tariff **(**REST) was implemented in 2006. The following chart shows the cost of solar modules on a $/W$_{DC}$ basis over the past 20 years.




As a result of these steep cost declines, driven in large part by increased demand and resulting growth in manufacturing, and the associated economies of scale and efficiencies, deployment of solar energy resources, especially PV, has grown nearly as dramatically – averaging over 75%/year for the last five years.



The growth has occurred across the spectrum of market segments – utility scale, commercial on-site, and residential on-site. As the latter two categories are of interest in this proceeding, the following chart[2] shows the deployment by major market segment over the last few years across the United States.

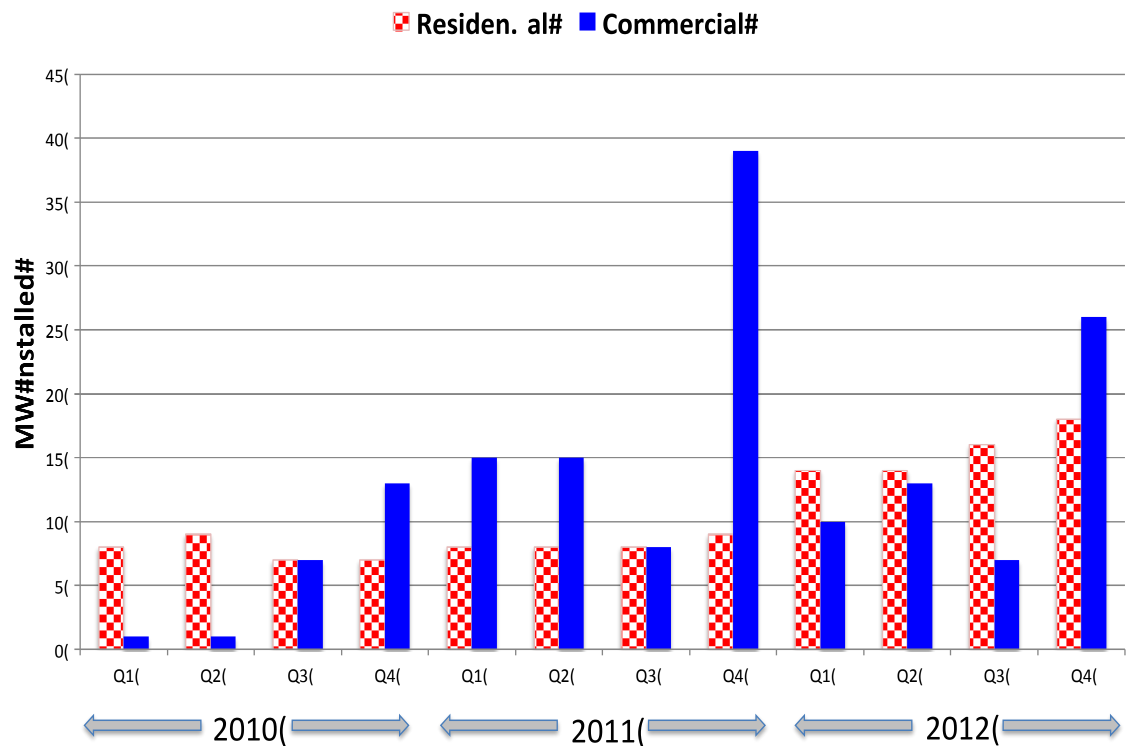



**Q. How have Arizona's markets grown?**

A. Arizona has been a leading state for solar development in no small part because of the vast amount of sunshine that the state enjoys. In 2012, Arizona moved into second place behind only California for the most MWs installed both for the year and cumulatively, and leads the nation with the highest solar capacity per capita. While the 2012 growth was in large part due to utility scale solar coming

[2] Source: SEIA/GTM Research, U.S. Solar Market Insight

on line, the customer-sited market performed very well, too, as the following chart[3] demonstrates:




**Q. Has the Arizona solar market created significant jobs?**

A. Yes. According to a recent report from The Solar Foundation,[4] there are nearly 10,000 solar jobs in the state - the highest level in the nation per capita. One of every 300 working people in Arizona work in the solar industry.

**Q. Has the REST played a role in this growth?**

A. Yes. The REST has played a very important role in diversifying the generation resources for the ACC-jurisdictional utilities, not just to renewably generated electricity in large centralized plants, but also through the Distributed Renewable

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[3] Ibid.
[4] Source: http://thesolarfoundation.org/solarstates

Energy Requirement (Section 1805) that promoted small systems on homes and businesses. For the first time, electricity consumers at all levels had a choice for their source of electricity. Not only was customer choice now a reality, but in the process jobs were created and the money spent on energy stayed in Arizona rather than going to out-of-state coal and natural gas producers, further helping to boost the state's economy.

As noted above, compliance with Section 1805 was demonstrated by acquiring Renewable Energy Credits or RECs from the owners of customer-sited solar generating systems in exchange for payments from the utility.

**Renewable Energy Credits and REST Compliance**

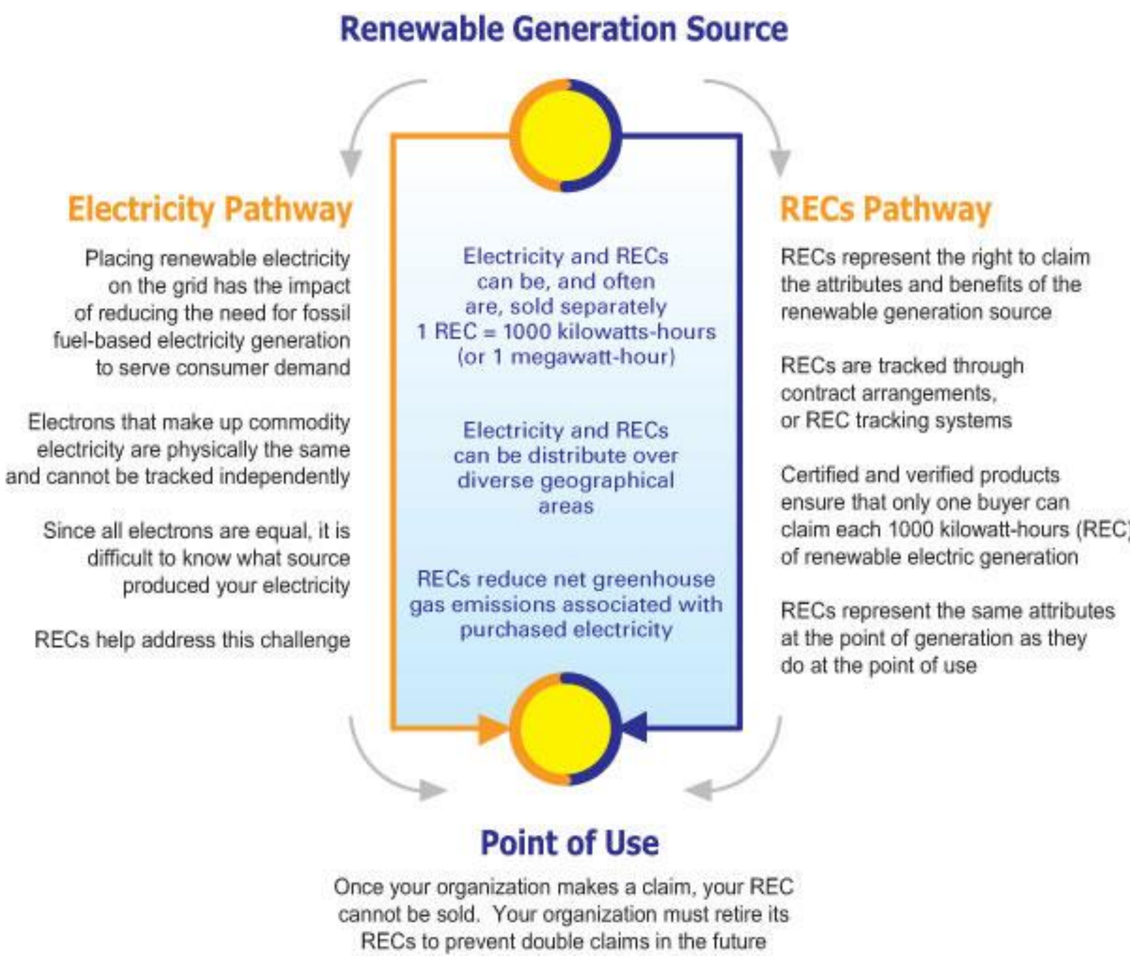
**Q. What is a Renewable Energy Credit or REC?**

A. The REST defines Renewable Energy Credit (sometimes known as a Renewable Energy *Certificate*) as "the unit created to track kWh derived from an Eligible Renewable Energy Resource or kWh equivalent of Conventional Energy Resources displaced by Distributed Renewable Energy Resources." More commonly, RECs are defined to include non-energy attributes, "including any and all credits, benefits, emissions reductions, offsets, and allowances, howsoever entitled, directly attributable to a specific amount of electric energy generated from a renewable energy resource."[5]

RECs are created whenever a renewable resource generates electricity,

[5] From the definition of RECs in the Colorado PUC Rules.

regardless of whether the utilities in the state (and territory) in which the project is located have a compliance obligation. The owner of the renewable energy system generally owns the RECs unless contractually transferred to another entity. The following chart[6] lays this out graphically:




**Q. Do RECs have value?**

A. Yes. There are two markets for RECs. The first is the compliance market, in which RECs are used by a utility or other energy provider to comply with a state renewable requirement. The second market is a non-compliance (sometimes

[6] Source: http://www.epa.gov/greenpower/gpmarket/rec_chart.htm

known as voluntary) market in which individuals, businesses or local governments acquire RECs to achieve certain sustainability or climate change goals. There are many companies[7] operating at the national, regional and state level that acquire and aggregate RECs from individual projects for resale to individuals and organizations. One of the largest, Bonneville Environmental Foundation (BEF), defines RECs as follows:

> A **Renewable Energy Certificate**, or REC, is a tradable, legal mechanism that represents the environmental benefits associated with one megawatt-hour of electricity generated from a renewable energy resource. These certificates may be sold and traded and the owner of the REC can legally claim to have purchased renewable energy. RECs incentivize the production of renewable energy by providing a source of revenue to electricity generated from renewable sources.

**Q. Why would individuals, businesses or other organizations purchase RECs?**

A. BEF notes the rationale for businesses to purchase RECs includes:

- To offset the carbon emissions associated with their electricity use
- To choose renewable power when their local utility does not offer a green power option
- To consolidate procurement of renewable energy for multiple locations instead of buying renewable electricity from multiple suppliers
- To offset electricity used for special events, such as conferences, when a direct purchase is not possible

To my knowledge, no one in this proceeding disputes that RECs have value outside of the Arizona compliance market.

**Q. In the non-compliance market, how can purchasers be assured they are receiving the values they are purchasing?**

[7] See http://www.green-e.org/base/re_products#res

A. The RECs in voluntary markets are usually certified. The leading independent certification organization is the Center for Resource Solutions which administers the Green-e program. This program has been around since 1997 and certifies and verifies over two-thirds of the RECs in the voluntary markets. In 2011 Green-e Energy certified more than 27 million MWh that was sold to over 713,000 retail customers. Based on the most recently available National Renewable Energy Laboratory data, Green-e Energy certified sales are estimated to make up over 99% of all retail REC sales in the U.S. and roughly two thirds of the retail renewable electricity sales in the U.S.[8]

**Q. Would you say that the REST has "run its course?"**

A. Not at all. The REST was implemented in 2006 and was designed to increase the diversity of resources on the utilities' grids through 2025, and maintain those minimum levels of renewables beyond. We are less than halfway through the growth period of this policy and, importantly, it has been working as intended. The major utilities have been able to meet their targets ahead of schedule in some cases. For example, APS and TEP have acquired sufficient Renewable Energy Credits (RECs) to meet the non-residential portion of the Section 1805 standard to nearly 2020. It is partly on this basis that the Commission eliminated incentives for non-residential solar installations. Notwithstanding this development, the utilities are still required to comply with the REST.

[8] http://www.green-e.org/docs/2011%20Green-e%20Verification%20Report.pdf

**Q. Is this an appropriate time for the Commission to address the Distributed Renewable Energy Requirement?**

A. In my view, it is premature. For example, we don't know how, if at all, other important clean energy policies such as net metering may change in the near future. Such changes have the potential to dramatically affect the economics of customer-sited solar, which in turn can impact its future rate of deployment and incentive levels.

**<u>The Utility Proposals</u>**

**Q. Can you summarize how APS and TEP propose to comply with the DE standard when incentives are no longer available to use to acquire RECs for compliance?**

A. Yes. APS proposes to "no longer have a firm DE requirement" but create a "track and record" process in which APS measures the incremental energy produced by eligible distributed renewable energy systems and reports it to the Commission for informational, but not compliance, purposes. It believes this method solves the problem of generation owners retaining ownership of the RECs created by their renewable generation. Mechanically, it proposes a waiver of the rules initially when cash incentives are eliminated, and over the longer term a change to the rules.

TEP proposes to simply eliminate the requirement as currently designed. It feels the standard is based on customer behavior and that, without incentives, the utility does not participate in the decision making process. It does go on to suggest an interim solution is necessary until the Commission carries out its suggestion. In this regard, it proposes a waiver of the Distributed Renewable Energy Requirement.

**Q. Does the APS track and record proposal avoid the double counting of customer's solar generation?**

A. I think it is very unclear whether the new APS track and record proposal truly has no impact on the value of customer-owned RECs. Anytime kWh are used to track compliance with the RES, the utilities are benefitting from RECs they do not own. RECs cannot retain their value in the voluntary market if their underlying kWh are being used for compliance purposes. If there is any uncertainty around that question, REC aggregators are likely to look elsewhere. Organizations like the Center for Resource Solutions are the national experts in this field and should be consulted before any new policy is adopted.

**Q. Do the utilities make any other suggestions?**

A. Yes. APS alludes to "some form of DE incentives" that may exist "as a policy matter" separate from direct cash incentives. It's unclear whether APS may be referring to net metering, interconnection, or some other policy matter, thus it is difficult to respond. On the other hand, TEP is quite direct in its alternative proposal that RECs be transferred to the utility in exchange "for the benefits associated with net metering."

We disagree with these suggestions for a number of reasons. First, no Arizona utility has proven any net cost exists associated with net metering. Moreover, the Commission has not ruled on the issue.

Second, APS is facilitating a series of technical conferences right now, in which TEP, SRP, staff, RUCO and many other traditional Commission stakeholders are participating, that is scheduled to continue into the summer. There is a great deal of new data and information coming out of this process and it is extremely premature and inappropriate for the utilities to draw conclusions at this time.

Third, due to the variety of distributed renewable energy sizes, technologies, and configurations deployed on homes and businesses, and the diversity of electric rates and rate structures, the net benefits and costs associated with net metering will of course vary dramatically, making any broadly applied value assumption incorrect.

Fourth, TEP options 2 and 3 would likely result in the Utilities claiming RECs they have not paid for nor acquired from the owner through a specific transfer, and don’t own. Option 3 is unclear whether it applies to past net-metering agreements or only future net-metering agreements and thereby risks invalidating contracts for REC sales that have already been made. While not directly taking the RECs for compliance, option 3 proposes to use the kWh to “Track and Reduce” the utility’s Annual Distributed Renewable Energy Requirement by that amount. This proposal is effectively the same as the APS

"Track and Record" and would also leech the value out of the RECs and render them valueless and likely uncertifiable by Green-e Energy.

**Q. Do you have any other comments on the utility proposals?**

A. Yes. There are interdependent elements in the REST that could be impacted by adopting the utility proposal to eliminate Section 1805. For example, there are other technologies besides solar PV such as solar domestic water heating covered by Section 1805 that would be penalized by striking this section.

## <u>The Vote Solar Proposal</u>

**Q. Does Vote Solar have a proposal to address the zero-incentive issue?**

A. Yes. Because RECs have value that could be compromised by the APS track and record proposal, we suggest an administratively simple and low-cost market-based method for continued acquisition of RECs when incentives are zero that maintains the integrity of the REST.

Given that the major utilities (TEP and APS) appear to have sufficient non-residential RECs to comply with Section 1805 for some time, we propose the issuance of a periodic standard offer for Residential RECs from systems that are installed <u>after</u> the incentives for residential solar are eliminated. Initially, we suggest a quarterly offer for a limited number of RECs to begin to get a feel for the market value. REC owners should also be encouraged to offer RECs at a price lower than the standard offer, which would be acquired first, in order of cost. Over time, the offers and timing can be refined. We suggest the following guidelines:

- The standard offer should be issued quarterly or semi-annually via a website (with notification through the monthly newsletter included in each bill) and should remain open for a few days or weeks depending on market response;
- The utilities should set an initial price at a low rate and ratchet up the price, if necessary, to gather sufficient RECs for compliance (at the utility's discretion to pay as-bid or set a market-clearing price)
- The Standard offer should be open to system owners and third party aggregators who acquire RECs and/or bid them on customer's behalf.

This is certainly not a new approach. In fact, utilities and load-serving entities are actively conducting market-based solicitations to obtain RECs in the following states: California, Colorado, Connecticut, Delaware Illinois, Maryland, Massachusetts, New Jersey, New Mexico, New York, Ohio and Pennsylvania. Arizona utilities have used a similar approach in soliciting non-residential solar projects, as well.

**Q. What are the advantages of this approach?**

A. This procurement method is consistent with Arizona law and Commission rules and does not require special consideration, creative work-arounds, obfuscating semantics, rule modifications or on-going waivers. Indeed, it is similar to the method used by the IOUs to acquire commercial solar RECs in the early days of the standard. It uses the market to assure that residential RECs are acquired at the lowest cost while respecting the property rights of solar system owners. Third, it avoids unnecessary complexity, administrative or regulatory burdens and uses a mechanism with which the utilities are quite familiar.

Finally, it puts Arizona in a leadership position on valuing RECs so that as other state markets reach a similar point in their evolution, Arizona utilities will have a competitive advantage.

**Q. Can this proposal be implemented immediately?**

A. In my view, yes. Any internal administrative work required can occur prior to the elimination of incentives. However, if the utilities feel they need more time, we would support a waiver of the residential portion of Section 1805 for up to one year to prepare.

## Recommendation

**Q. Please summarize your recommendations in this testimony.**

A. I recommend first that the Commission not take any near term action in this proceeding that could result in a loss of value in customer's property, i.e. the RECs that they own.

Second, I recommend that the Commission not reopen the REST rules at this time, but rather use the time during which incentives for residential solar are still available to investigate the lowest cost options through which utilities could acquire RECs. This will also provide the time necessary for other policies such as net metering to be more thoroughly reviewed in the context of Arizona utilities. This will allow the Commission to make a more reasoned decision based on more information on the economics of residential solar, the cost of mechanisms like track and record, and the cost of alternatives.

**Q. Does this conclude your direct testimony?**

A. Yes, it does.

## Appendix A

## Rick Gilliam

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*January 2012 to Present: Director of Research and Analysis, the Vote Solar Initiative, San Francisco, CA.* Manages the technical and policy research for Vote Solar, and engages in state, regional, and national campaigns related to key solar market policies.
*January 2007 to January 2012:* Vice President, Government Affairs, SunEdison, LLC, Beltsville, MD. Directs and manages policy development and implementation for the Americas at the regulatory and legislative levels. (Promoted from *Managing Director* June '09 and from *Director* Sept '07)
*Dec 1994 to Jan 2007*: Senior Energy Policy Advisor, Western Resource Advocates (formerly the Land and Water Fund of the Rockies), Boulder, Colorado. Develop innovative clean energy and air quality public policies within the economic and cultural framework unique to this region. Lead environmental advocate in development of Arizona Environmental Portfolio Standard, Nevada Renewable Portfolio Standard implementation rules, Colorado Renewable Energy Standard legislative proposals, and the 2003 Utah Renewable Energy Standard legislative proposal. Principal author of Colorado's Amendment 37 and lead advocate for related PUC rule development.
*Jan 1983 to Dec 1994*: Director of Revenue Requirements, Public Service Company of Colorado, Denver, Colorado. Primary responsibility for development of formal rate-related filings for this investor-owned utility for electric, gas, and thermal energy service in two states and the FERC. Developed and responded to a variety of proposed mechanisms to encourage the use of energy efficiency technologies, including innovative rate design approaches.
*Dec 1976 to Dec 1982*: Technical Witness (Engineer), Federal Energy Regulatory Commission, Washington, D.C. Testified as expert witness on behalf of the FERC in wholesale rate filings on technical, accounting, and economic issues related to rate design, pricing, and other issues.

### *A. Education*

Masters, Environmental Policy and Management, University of Denver, Denver, Colorado
Bachelor of Science, Electrical Engineering, Rensselaer Polytechnic Institute, Troy, New York

### *B. Related Publications*

Gilliam and Baker, "Green Power to the People," *Solar Today*, July/August 2006.
Dalton & Gilliam, "Walking on Sunshine: Energy Independence on the Rez," *Orion Afield*, Summer, 2002.
Gilliam, Rick, "Revisiting the Winning of the West," *Bulletin of Science, Technology & Society*, April 2002.
Blank, Gilliam, and Wellinghoff, "Breaking Up Is Not So Hard To Do: A Disaggregation Proposal," *The Electricity Journal*, May 1996.

***Summary of Formal Testimonies available upon request***