Court S. Rich AZ Bar No. 021290
Rose Law Group pc
6613 N. Scottsdale Road, Suite 200
Scottsdale, Arizona 85250
Direct: (480) 505-3937
Fax: (480) 505-3925
Attorney for Intervenor The Alliance for Solar Choice

BEFORE THE ARIZONA CORPORATION COMMISSION

BOB STUMP
CHAIRMAN

GARY PIERCE
COMMISSIONER

BRENDA BURNS
COMMISSIONER

BOB BURNS
COMMISSIONER

SUSAN BITTER-SMITH
COMMISSIONER

IN THE MATTER OF THE COMMISSION'S INVESTIGATION OF VALUE AND COST OF DISTRIBUTED GENERATION

DOCKET NO. E-00000J-14-0023

APPLICATION OF THE ALLIANCE FOR SOLAR CHOICE (TASC) FOR LEAVE TO INTERVENE

The Arizona Corporation Commission ("ACC" or "Commission") established this docket to investigate the value of distributed generation ("DG"), including net metering, in order to inform future Commission policy. On January 27, 2014, Steven Olea, the Director of the ACC's Utilities Division, submitted a letter to the docket ("Director's Letter") requesting that parties discuss the relevance and significance of a number of categories of DG costs and benefits and recommend other DG-related issues that should be considered in the docket. The Director's Letter also requests comments on "the process and methodology for assigning monetary values to DG costs and values." Finally, the Director's Letter requests parties recommend people or entities that should attend the workshops in this proceeding. The Alliance for Solar Choice ("TASC") respectfully submits these comments pursuant the Director's Letter.

TASC's member companies represent the majority of the nation's rooftop solar market and include SolarCity, Sungevity, Sunrun, Solar Universe, Verengo Solar, and REC Solar. These companies are important stakeholders in Arizona's Renewable Energy Standard and net metering programs and are responsible for thousands of residential, school, church, government and commercial solar installations in Arizona. TASC's member companies have brought hundreds of jobs and many tens of millions of dollars of investment to Arizona's cities and towns. Moreover, TASC's member companies have participated in stakeholder or regulatory proceedings in a number of states that have pursued answers to the same questions as those the Commission poses here. As such, TASC is intimately familiar with the technological, operational and ratemaking elements of net metering in Arizona and across the country.

An accurate and transparent analysis of the costs and benefits of DG, and net metering, requires careful consideration of the issue to be studied and the best practices for doing so. In investigating the issues identified in this docket, it is important that the Commission take notice of a number of conclusions that can be gleaned from the numerous DG cost-benefit studies completed in recent years. These conclusions include:

1. Net metering is not the same as customer-sited DG since the former is a billing policy and the latter is a resource;
2. A diverse set of perspectives should be utilized to fully evaluate DG resources, including the perspective of society, participating ratepayers, non-participating ratepayers and the utility;
3. A long-term perspective on the value of DG resources is important to fully capture the benefits DG resources bring to the grid over their useful life; and
4. A comprehensive set of costs and benefits is essential to accurately valuing DG resources.

On this last point, TASC applauds the Commission for compiling an exhaustive list of the potential costs and benefits of DG. TASC attaches to these comments a list that takes most of the components included in the Director's Letter, groups them into costs and benefits based on how most studies treat each individual component, provides a definition for each element, and

indicates the best process or methodology to assign a monetary value to each stated cost or benefit. A robust cost-benefit study will calculate the value of the costs and benefits in TASC's list using the methodologies and processes provided.

In addition, best practices require that the Commission ensure an unbiased result in any cost-benefit study, meaning the use of a third-party contractor if the Commission's staff does not have the resources to conduct the study. In addition, the Commission should maximize transparency and stakeholder participation in developing the scope, inputs, assumptions, and methodology used in the study and allow for comments analyzing any draft results before they are submitted to the Commission.

Finally, Tom Beach from Crossborder Energy and Jason Keyes with the Interstate Renewable Energy Council have extensive experience in developing DG cost-benefit studies in Arizona and a number of other states, and TASC recommends they be included in the ACC's workshops on these issues.

I. ACCURATE AND TRANSPARENT ANALYSIS OF THE COSTS AND BENEFITS OF DG REQUIRES CAREFUL CONSIDERATION.

In order to accurately and fairly understand the costs and benefits of DG, including net metering, careful attention must be paid at the outset to understanding what is going to be measured and then determining what are best practices for doing so. The "field" of cost-benefit studies of net metering and DG has changed and improved greatly in recent years and can provide the Commission insight into the best ways to calculate these values. The most recent studies include:

- California PUC / E3 2009-2010 Net Energy Metering Study.[1]
- California PUC / E3 2010 CSI Study.[2]
- California PUC / E3 2013 Net Energy Metering Ratepayer Impact Study.[3]

---

[1] *Net Energy Metering Cost Effectiveness Evaluation*, E3 Consulting, March 2010. Available at http://www.cpuc.ca.gov/NR/rdonlyres/0F42385A-FDBE-4B76-9AB3-E6AD522DB862/0/nem_combined.pdf.

[2] *CSI Cost-Effectiveness Evaluation*, E3 Consulting, April 2011. Available at ftp.cpuc.ca.gov/gopherdata/energy_division/csi/CSI%20Report_Complete_E3_Final.pdf.

[3] *California 2013 Net Energy Metering Ratepayer Impacts Evaluation*, E3 Consulting, October 2013. Available at http://www.cpuc.ca.gov/NR/rdonlyres/75573B69-D5C8-45D3-BE22-3074EAB16D87/0/NEMReport.pdf.

- Perez/Hoff, Solar in U.S. – "Too expensive or a Bargain?"(2011).[4]
- Austin Energy Value of Solar, Clean Power Research (CPR), Updated in 2012.[5]
- NYSERDA, Solar in NY, January 2012.[6]
- Value of Solar DG in PA and NJ, CPR, November 2012.[7]
- State of Vermont, January 2013 Net Energy Metering study.[8]
- Crossborder Energy, California Net Energy Metering Study, January 2013.[9]
- Crossborder Energy, Cost-Benefit Study of Solar DG in Arizona Public Service (APS) territory, May 2013.[10]
- SAIC, APS Net Energy Metering Study, May 2013.[11]
- Crossborder Energy, Idaho Power testimony, May 2013.[12]
- Crossborder Energy, The Benefits and Costs of Solar Generation for Electric Ratepayers in North Carolina, October 2013. [13]

---

[4] Perez, R., Zweibel, K., Hoff, T., *Solar Power Generation in the US: Too Expensive, or a Bargain?*. Energy Policy 39, 2011. pp. 7290-7297. Available at http://cleanpower.com/wp-content/uploads/Solar-Power-Generation-in-U.S.-too-expensive-or-a-bargain.pdf.

[5] Rabago, K., Norris, B., Hoff, T., *Designing Austin Energy's Solar Tariff Using A Distributed PV Calculator.* Clean Power Research & Austin Energy, 2012. Available at http://www.austinenergy.com/About%20Us/Newsroom/Reports/solarGoalsUpdate.pdf.

[6] "New York Solar Study: An Analysis of the Benefits and Costs of Increasing Generation from Photovoltaic Devices in New York," New York State Energy Research and Development Authority (NYSERDA), January 2012. Available at http://www.nyserda.ny.gov/Publications/Program-Planning-Status-and-Evaluation-Reports/Solar-Study.aspx.

[7] Rabago, K., Norris, B., Hoff, T., *Designing Austin Energy's Solar Tariff Using A Distributed PV Calculator.* Clean Power Research & Austin Energy, 2012. Available at http://www.austinenergy.com/About%20Us/Newsroom/Reports/solarGoalsUpdate.pdf.

[8] "Evaluation of Net Metering in Vermont Conducted Pursuant to Act 125 of 2012," Vermont Public Service Department, January 15, 2013. The staff of the Vermont PSC performed an extensive literature search in its January 2013 Evaluation. The report, along with a matrix of other studies it reviewed can be found at http://publicservice.vermont.gov/sites/psd/files/Topics/Renewable_Energy/Net_Metering/Act%20125%20Study%20201301 15%20Final.pdf .

[9] "Evaluating the Benefits and Costs of Net Energy Metering in California," January 2013, Crossborder Energy. Available at http://votesolar.org/wp-content/uploads/2013/07/Crossborder-Energy-CA-Net-Metering-Cost-Benefit-Jan-2013-final.pdf.

[10] "The Benefits and Costs of Solar Distributed Generation for Arizona Public Service," Crossborder Energy, May 8, 2013. Available at http://www.seia.org/sites/default/files/resources/AZ-Distributed-Generation.pdf.

[11] "2013 Updated Solar PV Value Report, Arizona Public Service," by SAIC Energy, Environment and Infrastructure, LLC. Available at http://www.solarfuturearizona.com/2013SolarValueStudy.pdf.

[12] "Direct Testimony of R. Thomas Beach" for the Idaho Conservation League, May 10, 2013. Submitted in Case No. IPC-E-12-27. Available at http://www.puc.idaho.gov/fileroom/cases/elec/IPC/IPCE1227/intervenor//IDAHO%20CONSERVATION%20LEAGUE/20130510BEACH%20DIRECT.PDF.

[13] Crossborder Energy, Benefits and Costs of Solar Generation for Ratepayers in North Carolina, October 18 2013. Available at

- Crossborder Energy, Benefits and Costs of Solar Distributed Generation for the Public Service Company of Colorado, December 2013. [14]
- RMI, Solar Valuation Meta-Study, July 2013.[15]
- IREC and Rábago Energy, LLC, "A Regulator's Guidebook: Calculating the Benefits and Costs of Distributed Solar Generation," October 2013. ("Regulator's Guidebook")[16]

Careful review of these studies will show significant variation in the methodologies used to evaluate the resources being studied. Good starting points on understanding the differences between these studies are the Rocky Mountain Institute's recent comparative, meta-analysis of the main DG cost-benefit studies completed in the last several years and the detailed literature review that the Vermont Commission assembled in support of its January 2013 net metering study.[17] In addition, the Interstate Renewable Energy Council and Rábago Energy, LLC recently published a guide to assessing the costs and benefits of solar DG.[18] In this guide, the authors present a standardized approach to assessing the various benefits and costs of DG solar with an explanation of how to calculate them that builds off all of the studies done to date.

---

http://energync.org/assets/files/Benefits%20and%20Costs%20of%20Solar%20Generation%20for%20Ratepayers%20in%20North%20Carolina%282%29.pdf.

[14] Crossborder Energy, Benefits and Costs of Solar Distributed Generation for the Public Service Company of Colorado, updated December 2, 2013. Available at http://www.oursolarrights.org/files/5513/8662/3174/Crossborder_Study_of_the_Benefits_of_Distributed_Solar_Generation_for_PSCo.pdf.

[15] "A Review of Solar PV Benefit & Cost Studies," Rocky Mountain Institute, 2013. See http://www.rmi.org/Knowledge-Center/Library/2013-13_eLabDERCostValue.

[16] Keyes, Jason B., Rábago, Karl R., Regulator's Guidebook: Calculating the Benefits and Costs of Distributed Solar Generation, Interstate Renewable Energy Council, Inc. and Rábago Energy, LLC, October 2013. Available at http://www.irecusa.org/wp-content/uploads/2013/10/IREC_Rabago_Regulators-Guidebook-to-Assessing-Benefits-and-Costs-of-DSG.pdf ("Regulator's Guidebook").

[17] "A Review of Solar PV Benefit & Cost Studies," Rocky Mountain Institute, 2013. Available at http://www.rmi.org/Knowledge-Center/Library/2013-13_eLabDERCostValue.
"Literature review summary for Vermont Act 125 evaluation of net metering," September 17, 2012, Vermont Public Service Department. See http://publicservice.vermont.gov/sites/psd/files/Topics/Renewable_Energy/Net_Metering/NM%20Lit%20Review%20011513.pdf.

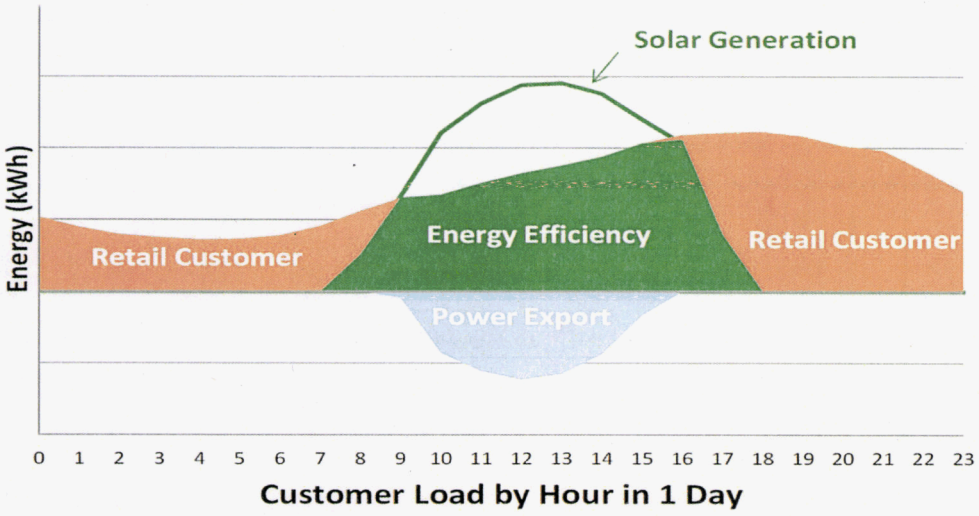
[18] Keyes, Jason B., Rábago, Karl R., Regulator's Guidebook: Calculating the Benefits and Costs of Distributed Solar Generation, Interstate Renewable Energy Council, Inc. and Rábago Energy, LLC, October 2013. Available at http://www.irecusa.org/wp-content/uploads/2013/10/IREC_Rabago_Regulators-Guidebook-to-Assessing-Benefits-and-Costs-of-DSG.pdf.

A review of these studies leads to a number of conclusions that should inform the Commission's request for a discussion of the methods used to evaluate the costs and benefits of customer-sited DG and net metering: (1) net metering is not the same as customer-sited DG; (2) a diverse set of perspectives should be utilized to fully evaluate DG resources; (3) a long-term perspective on the value of DG resources is important to fully capture the benefits DG resources bring to the grid over their useful life; and (4) a comprehensive set of costs and benefits is essential to accurately valuing DG resources. Each of these conclusions is discussed below.

A. Net Metering is not the Same as Customer-sited DG.

In TASC's view, one of the key conclusions from reviewing the above studies and the analysis undertaken by RMI and IREC/Rábago Energy, LLC is that, in discussing valuation of DG resources, it is important for all stakeholders to understand what specifically is going to be evaluated. Clarity on this point is essential at the outset because an analysis of the costs and benefits of "net metering" is frequently conflated with an analysis of the costs and benefits of "customer-sited DG". These terms should not be confused. Net metering is a billing policy, and customer-sited DG is an energy resource. While net metering has facilitated the installation of a significant number of customer-sited DG resources, only a portion of the costs and benefits from these resources can be attributed to net metering. We believe it is critical for stakeholders to recognize the difference between net metering and customer-sited DG in order to fully understand the nuances between appropriate methods for evaluating the costs and benefits of net metering as a policy tool to promote customer-sited DG.

Net metering is a billing arrangement that provides compensation through a bill credit at the applicable retail rate for power that is exported from a customer-sited DG system when that system produces more power than the host customer needs in any given moment. To illustrate how net metering works, Figure 1 shows the three different "states" of a residential net-metered PV system over the course of a day:



- **The "Retail Customer State."** There is no PV production at night. At this time, the customer is a regular utility customer, receiving all of its electricity from the grid.

- **The "Energy Efficiency State."** In this state, the sun is up, and there is some PV production but not enough to serve all of the homeowner's instantaneous load. The customer is supplied with power from the solar PV system as well as with power from the grid. The onsite DG reduces the customer's load on the grid in the same fashion as an energy efficiency measure. None of the solar customer's output flows out to the utility grid.

- **The "Power Export, or Net Metering, State."** In this state, the sun is high overhead, and PV production exceeds the customer's instantaneous use. The onsite solar power serves the house's entire load, and excess PV generation flows onto the grid, running the customer's meter backwards. As a matter of physics, this power will serve neighboring loads with 100% renewable energy, displacing power that the utility would otherwise generate at a more distant power plant and deliver to that local area over its transmission and distribution

("T&D") system. This state is the only one in which the customer's generation touches the grid.

In the net metering state, "the meter runs backwards" based on the amount of kWh exported, compensating the customer for supplying this excess electricity through a bankable kWh bill credit at the retail rate schedule at which the customer pays for energy. Net metering only compensates the customer for power *exports*. Generation from customer-sited DG that is consumed onsite, *i.e.*, electricity generated in the Energy Efficiency State (the green area in Figure 1), is not compensated through net metering. In that case, the customer simply uses the DG system to reduce load, and the operation of the onsite DG system appears as a load reduction similar to that from the installation of an energy efficiency measure, such as a more efficient washing machine or air conditioner.

Thus, an analysis of the costs and benefits of net metering only addresses the Power Export State, the light blue area in Figure 1. On the other hand, an analysis of the costs and benefits of customer-sited DG addresses the sum of the Power Export State and the Energy Efficiency State, that is, the sum of the light blue and green areas in Figure 1. It is important to recognize this difference when the Commission evaluates either the net metering policy or customer-sited DG resources.

Because net metering only addresses the compensation that the customer-generator receives for exports, any analysis of the costs and benefits of net metering should solely focus on those exports. The quantity and timing of net-metered exports from a solar DG unit depends on the hourly profiles of the customer's usage, the hourly profiles of the PV production, the relative size of the customer's load, and the relative size of the customer's DG system. Accordingly, a comprehensive and definitive analysis of the costs and benefits of net metering will require the modeling of exports with assigned costs and benefits on an hourly basis.[19]

---

[19] *See* "Evaluating the Benefits and Costs of Net Energy Metering in California," January 2013, Crossborder Energy. See http://votesolar.org/wp-content/uploads/2013/07/Crossborder-Energy-CA-Net-Metering-Cost-Benefit-Jan-2013-final.pdf; *Net Energy Metering Cost Effectiveness Evaluation*, E3 Consulting, March 2010. Available at http://www.cpuc.ca.gov/NR/rdonlyres/0F42385A-FDBE-4B76-9AB3-E6AD522DB862/0/nem_combined.pdf.

B. Perspectives Used to Measure the Costs and Benefits of DG Resources Should Be Comprehensive.

Another important takeaway from review of the studies enumerated above is that the best studies evaluate the costs and benefits of DG resources under a variety of perspectives:

(a) Society;

(b) Customer-generators who participate in net metering;

(c) Customers of a utility who do not participate in net metering; and

(d) Each utility that offers net metering.

The perspectives enumerated are those that are typically examined in the cost-effectiveness tests used in Arizona and many other states to evaluate other types of demand-side programs, including demand response and energy efficiency.[20] In the lexicon of such widely used cost-effectiveness tests, these perspectives comport with the following:

(a) Societal Cost Test[21]

(b) Participant Cost Test

(c) Ratepayer Impact Measure Test, and

---

[20] *See California Standard Practice Manual: Economic Analysis of Demand-Side Programs and Projects*, October 2001. Available at http://www.energy.ca.gov/greenbuilding/documents/background/07-J_CPUC_STANDARD_PRACTICE_MANUAL.PDF.

[21] The Societal Test is the Total Resource Cost Test including various externalities. Energy Division, California Public Utilities Commission, *Overview of Societal Cost Test Proposal*, June 6, 2013. Available at http://www.cpuc.ca.gov/NR/rdonlyres/B534A7BE-EF8D-4383-9FFC-42D69F1396EF/0/EnergyDivisionSCTProposalJune2013_DRAFT.pdf.

(d) A Program Administrator Cost Test.

The Regulator's Guidebook provides further discussion on the differences between these tests so we will not repeat that discussion here.[22]

C. A Long-Term Perspective is Critical to Accurately Assessing the Costs and Benefits of DG Resources Especially When Considering Deferred T&D Costs.

When assessing the benefits and costs of DG resources, it is important to use a time frame that corresponds to the useful life of DG resources, which are typically 20 to 30 years. A long-term analysis is necessary in order to treat DG resources equally with other utility resources, both demand- and supply-side. When a utility assesses the merits of adding a new power plant, or a new energy efficiency program, the company will look at the costs to build and operate the plant or the program over their useful lives, compared to the costs avoided by not pursuing other resource options. Thus, a key factor is that the analysis of DG or net metering in Arizona must cover the full 20- to 30-year life of typical DG resources.

DG resources can reduce peak demands on the utility grid, and thus allow the utility to avoid or defer long-term investments in transmission and distribution ("T&D") infrastructure. However, utilities often do not assess the impacts of demand-side resources with 20 to 30-year useful lives on their long-term need for T&D infrastructure capacity. For example, although integrated resource plans for generation typically look ahead for 15 to 30 years, utility transmission and distribution plans often have a much shorter time horizon of 3 to 5 years. Accordingly, it is often useful to use calculations of long-term marginal T&D costs to determine the T&D capacity costs that can be avoided if DG resources reduce peak utility loads.

D. Clearly Defining the Benefits and Costs of DG Resources From the Onset will Increase Transparency and Clarity of Any Subsequent Analysis.

TASC applauds the Commission for recognizing that the identification of costs and benefits is an important aspect of understanding the value DG provides in a transparent fashion.

---

[22] Regulator's Guidebook at pg. 14.

The Director's Letter lists a number of costs and benefits that are employed in the body of studies above. It is vital that the benefits and costs used in any analysis are clearly defined, and the best methodologies for determining the value of each cost-benefit element are identified.

As a starting point for discussion these issues, TASC attaches to these comments a list of relevant DG costs and benefits. TASC's lists takes the components listed in the Director's Letter and groups them into costs and benefits based on how most studies treat each individual component (TASC's list gives grid support and ancillary services its own category since these DG attributes can either be a cost or a benefit). In addition, the attached list provides a definition for each element and indicates the best process or methodology to assign a monetary value to each stated cost or benefit.

In addition, TASC adds two components to the list. While the Commission's list of costs and benefits is exhaustive, TASC believes a rigorous analysis of the costs or benefits of DG should also include:

- Bill Credits or Energy Payments: These are the main cost of any DG or net metering program and include the bill credits, payments or monetary value of kWh credits at the retail rate the utility provides to solar customers as compensation for energy exported to the grid.
- Visibility Benefits: These benefits include increased recreation value and economic activity associated with improved visibility due to emissions reductions from power generation. This impact has long been quantified in traditional environmental impact analyses. [23]

It is important to note that the costs and benefits that are included in an analysis will depend on which perspective – societal, participating ratepayer, non-participating ratepayer or utility – is being considered. There are also benefits of DG that will be hard to quantify – for example, civic engagement / conservation awareness / consumer interest. Some states (Colorado, for example) include such societal benefits through a defined adder (for example, 10% in Colorado) to the benefits of demand-side programs in order to capture such difficult-to-quantify benefits.

[23] *See, e.g.*, "The Benefits and Costs of the Clean Air Act from 1990 to 2020", Office of Air and Radiation, U.S. Environmental Protection Agency, p. 18 (March 2011).

Finally, TASC believes the following costs and benefits listed in the Director's Letter are either irrelevant to the Commission's investigation or too difficult to measure to be of value to the Commission's purposes:

- Energy Subsidies (incentives, rebates, tax credits, etc.): Ratepayer-funded incentives are no longer available in Arizona Public Service territory and therefore do not need to be included.
- Ratepayer Cross-Subsidization: Cross-subsidies are an important, potential *result* from a cost-benefit analysis conducted from the perspective of either a participating ratepayer or a non-participating ratepayer. That is, if customer-generators provide a net benefit to non-participating ratepayers, a cross-subsidy may exist if customer-generators are not compensated for providing that benefit. Conversely, if net metering or DG place a net burden on non-participating ratepayers, adjustments to rate design may be appropriate to restore the correct balance. However, this is a result and not an input or consideration in conducting a study. Thus, the issue should not be included as a component of a cost-benefit analysis.

II. BEST PRACTICES REQUIRE INDEPENDENCE, TRANSPARENCY AND STAKEHOLDER INPUT.

If the ACC decides to pursue its own study, TASC believes a rigorous examination of costs and benefits of DG requires an unbiased analysis conducted either by the Commission's staff or an outside consultant with the following qualifications:

- Prior experience in conducting cost-benefit evaluations of demand-side programs, preferably prior experience conducting net metering/DG cost-benefit or benefit-alone studies;
- A deep knowledge of the technological, operational and policy elements of customer-sited generation; and
- A significant track record of consulting for state regulatory commissions on complex public policy issues.

The most crucial qualification for a consultant is independence. The Commission should ensure that any third party consultant it chooses has no on-going or planned projects, or other business relationship, with any jurisdictional utilities, or those utilities' affiliates, subsidiaries or parent companies. It should be recognized that customer self-generation can result in a long-term reduction in utility sales and long-term changes in the role and scope of the utility as a business, which can bias utility views against a full recognition of DG benefits. At the Commission's November 14, 2013 open meeting on net metering, Commissioner Bob Burns observed that "cost shift" concerns with net metering have implications that extend beyond participating and non-participating customers, to the utility business model itself. [24] TASC agrees, and for this reason submits that independence will be the key qualification for the entity selected to perform this study.

Finally, the Commission should maximize transparency and stakeholder participation. The Commission should allow for comment and workshops on the study's scope, inputs, assumptions, and methodology. Moreover, the study's authors should submit a draft of the completed analysis for full stakeholder review before it is submitted to the Commission. Such procedural safeguards will ensure that any cost-benefit study will uphold the Commission's tradition of transparency and broad stakeholder input.

III. RECOMMENDATIONS FOR WORKSHOP PARTICIPANTS

Tom Beach from Crossborder Energy and Jason Keyes with the Interstate Renewable Energy Council have extensive experience in developing DG cost-benefit studies in Arizona and a number of other states. TASC recommends they be included in the ACC's workshops on these issues.

IV. CONCLUSION

TASC looks forward to discussing these issues with the Commission and stakeholders at workshops and through comments in this proceeding.

---

[24] Statement of ACC commissioner Bob Burns, at the ACC open meeting on November 14, 2013. This quote is at 4:32:57 to 4:33:54 of the video of this meeting, which can be found at http://www.azcc.gov/divisions/it/streaming/events.asp .

Respectfully submitted this 14th day of February, 2014.

Court S. Rich
Attorney for Intervenor TASC

Original and 13 copies filed on this 14th day of February, 2014 with:

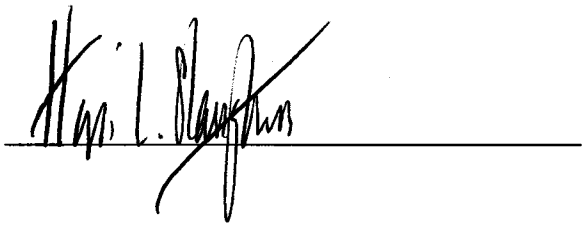
Docket Control
Arizona Corporation Commission
1200 W. Washington Street
Phoenix, Arizona 85007

I hereby certify that I have this day served the foregoing documents on all parties of record in this proceeding by sending a copy via electronic mail to:

Steve Olea
AZ Corporation Commission
1200 W. Washington St.
Phoenix, Arizona 85007

Janice Alward
AZ Corporation Commission
1200 W. Washington St.
Phoenix, Arizona 85007

Lyn Farmer
AZ Corporation Commission
1200 W. Washington St.
Phoenix, Arizona 85007-2927



Relevant Costs and Benefits of Distributed Generation and Recommended Definitions and Methodologies

The list below takes the components listed in the Director's Letter and groups them into costs and benefits based on how most studies treat each individual component. Grid support/ancillary services has its own category since these DG attributes can either be a cost or a benefit. In addition, the list provides a definition for each element and indicates the best process or methodology to assign a monetary value to each stated cost or benefit. Rather than include detailed explanations of these processes and methodologies, we provide, where appropriate, references to sources with more complete explanations.

It is important to note that the determination of which of the costs and benefits below are included in an analysis will depend on which perspective – societal, participating ratepayer, non-participating ratepayer or utility – is being considered.

General Costs

Costs	**Terms Used in Director's Letter**	**Definition**	**Methodology / Process**
Bill Credits or Energy Payments	(Not included)	The bill credits, payments or monetary value of kWh credits at the retail rate the utility provides to solar customers as compensation for energy exported to the grid.	Analyze utility rate tariffs to provide this information.
Administrative Costs	-Avoided Utility Administrative Costs	Any utility-incurred costs, but only to the extent that they exceed the comparable metering and billing costs for regular utility customers. While the Director's Letter includes these expenses as a benefit, which they certainly could be given that they enable benefits, most studies include administrative expenses as a cost.	Analyze vetted utility data regarding this information.

Ancillary Services and Grid Support

Benefit/Cost	Terms Used in Director's Letter	Definition	Methodology / Process
Ancillary Services and Grid Support	-Ancillary Services -Reactive Supply & Voltage Control -Frequency Regulation -Energy imbalance -Operating Reserves -Scheduling and/or Forecasting -DG System Integration Costs -Technology Synergies	Ancillary services and grid support enable the reliable operation of a grid hosting customer-sited DG. The value of ancillary services and grid support can be either a net cost or a net benefit when compared with the costs that would otherwise be incurred without customer-sited DG. Such services include reactive supply, voltage control, frequency regulation, energy imbalance, operating reserves and scheduling/forecasting. TASC believes that the value of "technology synergies", such as advanced inverter technology, or the combination of rooftop solar and energy storage, would also be accounted for here.	Model ancillary services benefit and costs. Regulator's Guidebook at 29-30 and 39-40.[1] Can be a benefit if the utility's ancillary service needs are a function of load. See E3 and Crossborder studies of NEM in California, cited in the TASC comments. Easier to quantify in markets where ISOs operate visible ancillary service markets.

General Benefits

Benefit	Terms Used in Director's Letter	Definition	Methodology / Process

[1] Keyes, Jason B., Rábago, Karl R., Regulator's Guidebook: Calculating the Benefits and Costs of Distributed Solar Generation, Interstate Renewable Energy Council, Inc. and Rábago Energy, LLC, October 2013. Available at http://www.irecusa.org/wp-content/uploads/2013/10/IREC_Rabago_Regulators-Guidebook-to-Assessing-Benefits-and-Costs-of-DSG.pdf

Benefit	Terms Used in Director's Letter	Definition	Methodology / Process
Avoided Energy Costs	-Avoided Fuel / Purchased Power Costs -Avoided Variable O&M	The cost of energy that would have otherwise been generated to meet customer needs.	Determine future market price of energy over the DG lifetime. Regulator's Guidebook at 21-22.
Avoided Energy Losses	-Avoided Line Losses	The value of the additional energy generated by central plants that would otherwise be lost due to inherent inefficiencies in delivering energy to the customer via the transmission and distribution system.	Compare total line losses without DG to total line losses with DG. Regulator's Guidebook at 23-24.
Avoided Capacity Costs for Generation	-Avoided Power Plant Capital Costs – Customer's Capital Contribution -Avoided Fixed O&M -Avoided Power Plant Decommissioning Costs -Distributed Energy Capacity Value -Avoided Generation Capacity (new generation $) -PV System Orientation	The cost and amount of generation capacity that can be deferred or avoided due to customer-sited DG. The Director's Letter included six components of this benefit separately. The orientation of a PV system will affect the amount of capacity that DG provides. In turn, the amount of capacity DG provides will directly impact the avoided need for new generation capacity. The value of the avoided need for new generation capacity includes avoided capital costs, avoided fixed O&M, and avoided decommissioning costs.	Determine the capacity value of DG using the Effective Load Carrying Capacity methodology. Regulator's Guidebook at 24-26. Control area operators may have comparable procedures for setting the resource adequacy capacity of DG resources. Determine the capital and O&M costs of the marginal generator that is avoided. Regulator's Guidebook at 24-26.

Benefit	Terms Used in Director's Letter	Definition	Methodology / Process
Avoided and Deferred Capacity Costs for T&D	-Avoided / Delayed Transmission System Investment -Avoided / Delayed Distribution System Investment	The value of the avoided or deferred T&D infrastructure investments due to customer-sited DG.	Use location-specific data to conduct individualized assessment of DSG system value. Regulator's Guidebook at 26-29. Important to consider long-term avoided costs, beyond the utility's near-term T&D plans.
Avoided Renewables Costs	-Avoided Renewable Energy Standard (RES) Costs	When customer-sited generation reduces onsite load, a utility does not have to procure as much renewable generation capacity to meet renewable portfolio standards. This reduction in procurement obligations results in cost savings. Customer-owned DG satisfies customer demand to be served with a penetration of renewable generation in excess of the utility's RES requirements, and thus can avoid the costs which the utility would incur to meet such customer preferences through green pricing programs or other initiatives.	Quantify reduction in RES compliance costs and calculate against market price for the relative compliance instrument. Regulator's Guidebook at 32-35. Customer demand for a higher-than-RES share of renewables can be valued based on the cost of utility "green pricing" programs which serve the same customer demand. The U.S. Department of Energy maintains a data base of such programs.[2]

---

2 EERE, U.S. DOE, Green Pricing: Utility Programs by State, http://apps3.eere.energy.gov/greenpower/markets/pricing.shtml?page=1 .

Benefit	Terms Used in Director's Letter	Definition	Methodology / Process
Fuel Price Hedge	-Avoided Fuel Hedging Costs	The avoided costs a utility would otherwise incur to guarantee energy fuel costs are fixed.	Compare the cost of a 30-year investment with substantial price uncertainty to one with a fixed price. Regulator's Guidebook at 30.
Energy Market Impacts	-Avoided Market Price Mitigation (reduction of wholesale market clearing prices for natural gas and electricity)	Customer-sited DG reduces the demand for fuel to power central station generators and for wholesale power in the wholesale electricity market, reducing wholesale market clearing prices for natural gas and electricity. Reduced demands in these markets lowers prices across the entire market served, providing benefits for the general body of consumers who use these markets.	Estimate the difference between current price projections and hypothetical price projections without the reduction in demand caused by DG. Regulator's Guidebook at 31. Easiest to calculate for regions with deregulated markets and visible market prices. For example, this benefit is regularly included in avoided cost calculations in the U.S. Northeast.[3] These benefits in the natural gas market also have been quantified.[4]

[3] The market price mitigation benefit of demand-side resources, also called the demand reduction induced price effect (DRIPE), has been estimated at 19-25% of combined energy and capacity prices. Synapse Energy Economics, "Avoided Energy Supply Costs in New England: 2011 Report" (August 11, 2011), at Exhibit 1-1. Available at http://www.synapse-energy.com/Downloads/SynapseReport.2011-07.AESC.AESC-Study-2011.11-014.pdf.

Benefit	Terms Used in Director's Letter	Definition	Methodology / Process
Environmental Benefits	-Water Consumption -Cost of Environmental Compliance	The saving realized from reduced air emission control or allowance costs, including those related to carbon, criteria air pollutants and reduced water use.	To the extent not reflected in the cost of avoided energy, quantify the reduction in carbon, criteria air pollutants, and water use, and calculate using the market price for the appropriate compliance instrument (such as the price of carbon offsets). Regulator's Guidebook at 32-35. There are long-term benefits associated with using less water as Arizona anticipates scarcity in coming years.
Social Benefits	Please see table below.		

Social Benefits

---

[4] A Lawrence Berkeley National Lab study estimated that the consumer gas bill savings associated with increased amounts of renewable energy and energy efficiency, expressed in terms of $ per MWh of renewable energy, range from $7.50 to $20 per MWh. Wiser, Ryan; Bolinger, Mark; and St. Clair, Matt, "Easing the Natural Gas Crisis: Reducing Natural Gas Prices through Increased Deployment of Renewable Energy and Energy Efficiency" (January 2005), at ix, http://eetd.lbl.gov/sites/all/files/publications/report-lbnl-56756.pdf.

Benefits	Terms Used in Director's Letter	Definition	Methodology / Process
Health Benefits	-Health Effects (Benefits)	The reduction in societal costs from health risks, including reduced morbidity and mortality, related to air pollution from fossil-fuel production, transportation, and generation.	Quantify reduction in carbon or criteria air pollutants and calculate against estimates of the cost of impacts from such pollution in public health studies. Regulator's Guidebook at 32-35.
Security and Resiliency of the Electric Grid	-Grid Security -Grid / Service Reliability	The benefits to society (*i.e.*, the economy) realized from: (1) The reduction in outages from reduced congestion along the T&D network, (2) The minimization of large-scale outages resulting from a more diverse and dispersed electricity supply, and (3) Back-up power provided by customer-sited DG.	Compare assumed risk of outages and blackouts, assumed cost to strengthen grid to avoid that risk, and assumed ability of DG to strengthen the grid. Regulator's Guidebook at 31. This benefit has been calculated for DG in several Mid-Atlantic states.[5]

[5] Hoff, Norris, and Perez, *The Value of Distributed Solar Electric Generation to New Jersey and Pennsylvania* (November 2012), at Table ES-2, available at http://mseia.net/site/wp-content/uploads/2012/05/MSEIA-Final-Benefits-of-Solar-Report-2012-11-01.pdf.

Benefits	Terms Used in Director's Letter	Definition	Methodology / Process
Avoided Environmental and Safety Costs	-Non-Compliance Environmental Effects	The reduction in costs related to: (1) Fewer land use impacts because customer-sited DG is installed in the already-built environment; (2) The savings realized from avoided accidents, pollution and economic loss associated with the extraction, transportation, distribution, and processing of fossil fuels; and (3) The reduced compliance costs related to a decrease in the extraction, transportation, distribution and proceeding of fossil fuels.	Difficult to calculate, although the cost of specific accidents can be very large.
Effects on Economic Activity and Employment	-Economic Development and Jobs	The value from the increase in jobs and local economic development related to customer-sited DG and the resulting increase in welfare and economic productivity of children and working adults from the above health benefits.	Calculate tax enhancement value from derived from DG industry in the state. Regulator's Guidebook at 35.
Visibility Benefits	(Not included)	The increased recreation value and economic activity associated with improved visibility due to emissions reductions from power generation.	Assess using environmental impact analysis methodology.[6]

[6] *See, e.g.,* "The Benefits and Costs of the Clean Air Act from 1990 to 2020", Office of Air and Radiation, U.S. Environmental Protection Agency, p. 18 (March 2011) (available at http://www.epa.gov/oar/sect812/feb11/summaryreport.pdf).