THE Vote Solar INITIATIVE

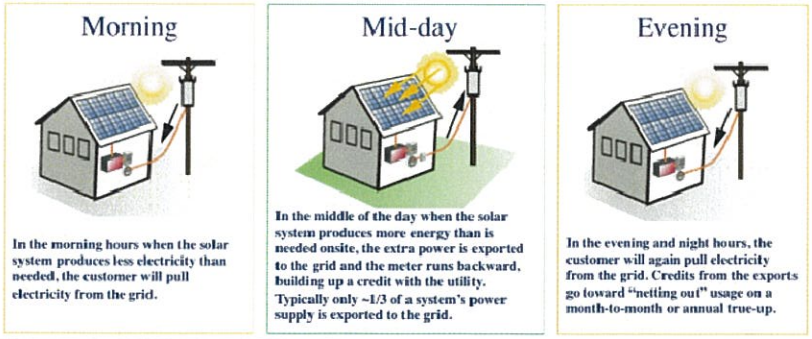
Evaluating the Costs and Benefits of DG Solar & Net Metering

December 3, 2012

What is net metering?

What is Net Metering
Like roll over minutes on your cell phone bill, net metering allows a solar customer's electric meter to "spin backwards" ensuring that they receive fair credit for any electricity that they put back on the grid rather than using themselves.

Why is it an important policy tool?
As a general principle, net metering is one of the most effective policies for supporting customer generation of renewable energy and is currently enabling customer---sited generation in **43 states and the District of Columbia.** The simplicity and understandability of net metering have been pivotal in reducing barriers to consumer uptake of energy technologies such as solar, and is arguably one of most successful market transformation policies for the renewable energy economy.



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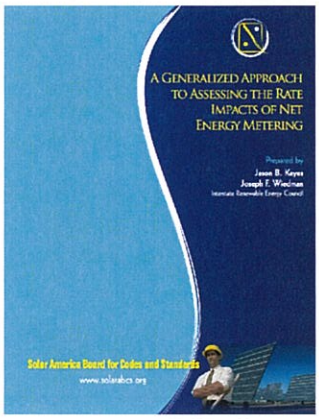
Is Net Metering a Subsidy?

To answer this question, a comprehensive cost benefit analysis of the net metering program must be completed....

A study should measure these benefits and costs.....

Benefits to the Utility	Costs to the Utility
Avoided energy/fuel costs	NEM bill credits
Avoided T&D line losses	Program administration
Avoided Capacity Costs	
Avoided T&D costs & O&M	
Avoided environmental costs	
Natural gas market impacts	
Reliability benefits	



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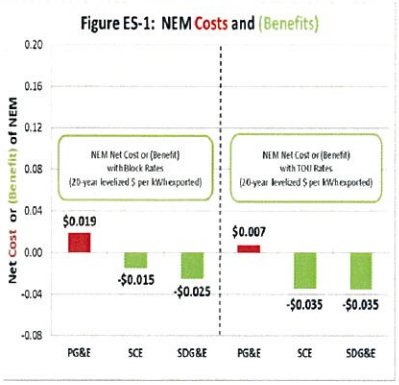
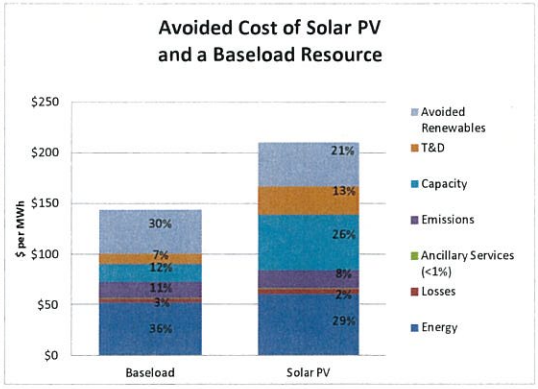
Measuring the Value of Solar

Are solar customers a net benefit or net cost to utilities?

- Crossborder Energy's Evaluation of Residential Net Metering in California (2012). Commissioned by Vote Solar.
- Study not yet complete, but shows net benefits across all customer classes combined for each utility.





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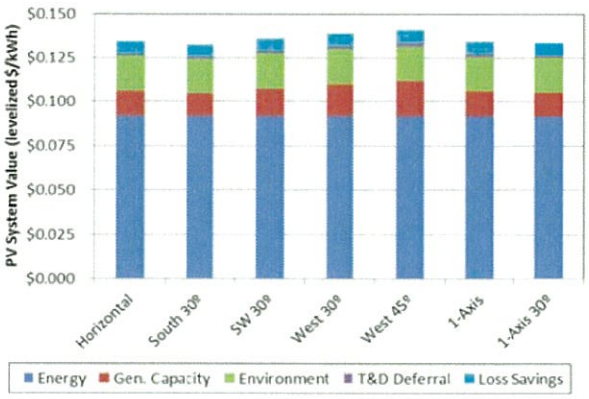
Measuring the Value of Solar

Are solar customers a net benefit or net cost to utilities?

- Austin Energy "Value of Solar Tariff" - PV Value Results by Component and Configuration (2012)



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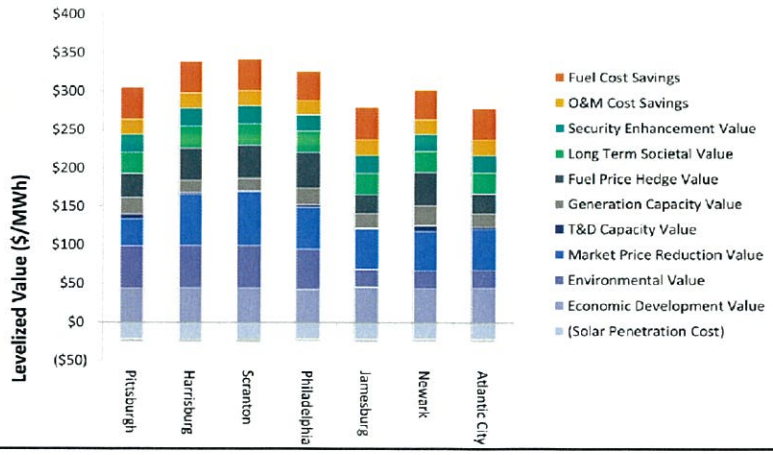
Measuring the Value of Solar

Are solar customers a net benefit or net cost to utilities?

- Clean Power Research's DE Valuation study for PA and NJ (2012). Commissioned by MSEIA & Vote Solar and others.

Figure ES- 1. Levelized value ($/MWh), by location (South-30).



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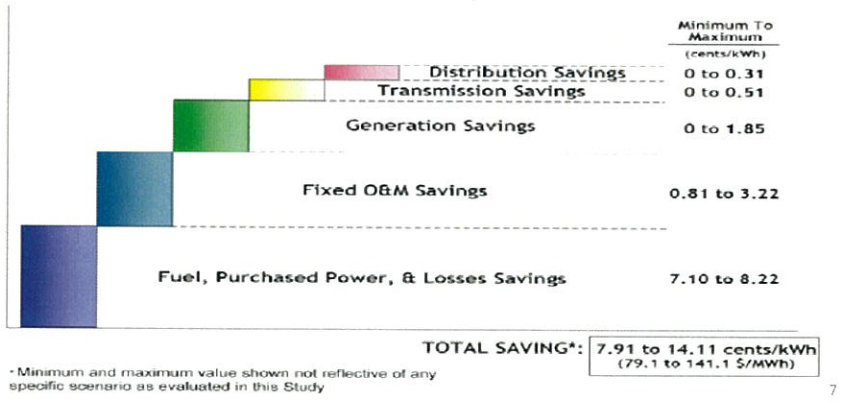
Measuring the Value of Solar

Are solar customers a net benefit or net cost to utilities?

- RW Beck's DE Valuation study for Arizona Public Service (2009).

Solar DE Value Buildup



*Minimum and maximum value shown not reflective of any specific scenario as evaluated in this Study

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Has NV Energy properly studied the costs & benefits of DG solar & net metering?

In 2010 NVE hired Navigant Consulting to undertake a study focused on evaluating the technical and economic impacts of DG on NV Energy's system and its ratepayers.

Costs Analyzed		Benefits Analyzed								
Net metering bill credits	Program admin costs	Avoided energy purchases	Avoided capacity purchases	Avoided T&D line losses	Avoided T&D investments/O&M	Environ. benefits	Natural gas price hedge	Avoided RPS purchases	Ancillary services and VAR support	Calculation of net cost to non-participants
X	X	Calculated but likely underestimated.	Calculated but likely used an incorrect (low) ELCC	Did not calculate	Looked at distribution losses	Did not apply quantitative value to potential avoided emissions	Did not calculate	Did not calculate	Did not calculate	X

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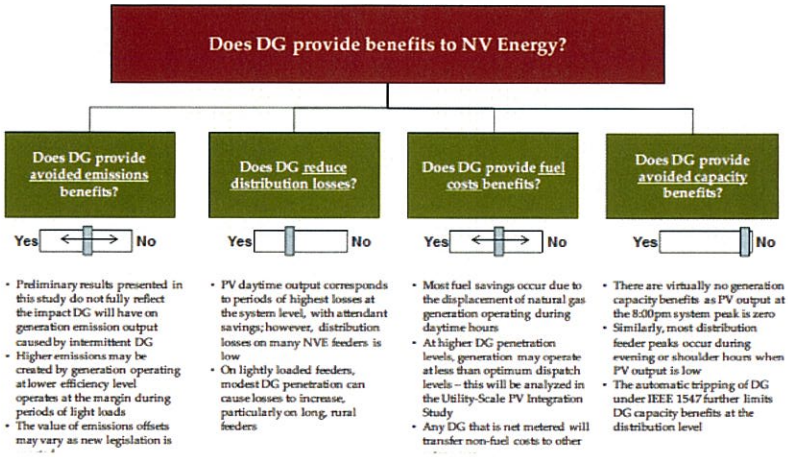
Navigant's Assessment of Benefits was Mostly Qualitative….

Figure 3. Benefits Analysis Summary



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A Critique of Navigant's Findings

Are these findings accurate?

Table 6. DG Savings and Net Costs ($/MWH)

Net Costs	2011	2015	2020
Total Cost of DG Output	$108	$184	$219
Less Savings for DG Benefits	$33	$63	$79
Net Cost to NV Energy Ratepayers	$75	$121	$141

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A Critique of Navigant's Findings

1) Lack of meaningful stakeholder engagement.

Although several stakeholder meetings were held, there was little opportunity to vet or inform the assumptions of the economic analysis. The one solar representative in the process had expertise in grid integration of renewable energy but not in the area of solar costs and rate impacts. Most of the stakeholder meetings focused on the more technical aspects of grid integration, not the economic analysis of DG and net metering specifically. The stakeholders were not given an opportunity to discuss or vet the methodology for the economic evaluation portion of the study.

When the Navigant study was filed at the PUC, Vote Solar, SEIA, and Hamilton Solar, and Bombard Electric ended our joint reply comments with this note:

"The parties intervening in this docket, as well as the [Vote Solar, SEIA, Hamilton Solar and Bombard Electric] have indicated that the economic analysis may have been beyond the scope of the original intention. If time or resources do not permit a re-analysis of DG economics, [Vote Solar, SEIA and Bombard Electric] then recommend the removal of said portion from the final report." (submitted 2/25/2011 in Docket 10-04008)

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A Critique of Navigant's Findings

2) Benefits not properly studied.

Benefits not included or not properly studied:

Avoided energy purchases	Avoided capacity purchases	Avoided T&D line losses	Avoided T&D investments/ O&M	Environ. benefits	Natural gas price hedge	Avoided RPS purchases	Ancillary services and VAR support	Reliability Services

*** Note on Capacity Benefits:**

The study found that "capacity benefits are not significant due to low DG capacity factors, intermittent output and non-alignment of DG output with feeder and system peak demand." NV Energy's current IRPs reduce the utility's future need for capacity by a portion of installed DG capacity, indicating that NV Energy assumes that DG will avoid capacity-related costs. Navigant's study is inconsistent with the IRPs, as Navigant does not appear to assign to DG any benefits from reduced generation or transmission capacity costs.

According to an NREL study assessing Effective Load Carrying Capacity, PV in Nevada should have an ELCC of 59% for a double axis tracker, 45% for horizontal orientation, 47% for a South 30 degree tilt, and 51% for a Southwest 30 degree tilt. It is unclear if Navigant used an appropriate ELCC when conducting this study.

*** Note on Reduced Generation or Transmission Capacity:**

Although the study notes that benefits from these categories may exist, the study does not appear to assign any benefits to these categories.

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A Critique of Navigant's Findings

3) **Assessment of impact of different customer classes**: Though 'rate design impacts' were not considered to be within the scope of this study, it is impossible to asses the economic impact of adding more DG solar, and of offering net metering, without looking at individual customer classes and the tariffs those customers are on. Commercial customers on a two-part rate (who continue to pay fixed cost through demand charges) are not properly evaluated in the study. It is unclear what mix of residential, commercial and industrial customers were analyzed under the DG scenarios.

4) **Electricity Pricing:** Navigant assumes that NV Energy's overall rates will increase at the same rate as the utility's power supply costs. This overstates the likely escalation in NV Energy's retail rates, because fuel costs comprise just a portion of the utility's rates. NV Energy's analysis in its IRPs of the costs and benefits of its energy efficiency programs uses retail rates that escalate from 1.7% to 2.5% per year.

5) **Rate of deployment of DG:** Navigant's figures comparing the costs and benefits of DG over the 2011-2020 period at various levels of DG penetration (1%, 9%, and 15%) appear to assume that the target penetration of DG is reached immediately, in the first year (2011). It is unrealistic to expect a large amount of DG to come on-line immediately. This significantly overstates the net costs of DG in the first years (when the costs are greater than the benefits) in comparison to the later years of the decade (when Crossborder's analysis shows that the benefits will exceed the costs for a much larger amount of DG).

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Crossborder Energy Analysis

Vote Solar, SEIA (formerly Solar Alliance), Hamilton Solar, and Bombard Electric commissioned Crossborder Energy Consultants to critique the study, and update the study if more appropriate assumptions were idenitfied.

- **DG Solar deployment:** Crossborder's analysis has used trajectories for DG installation that are more realistic, and that are comparable to Navigant's Figure 6. Specifically, we assumed that DG penetration, as a percentage of peak demand, increases linearly from 0% in 2010 until it reaches the target penetration (1%, 9%, or 15%) in 2020.

- **Customer class participation assumptions:** The Navigant study does not state how the PV capacity is allocated among NV Energy's customer classes. Crossborder assumed that PV systems are installed by residential, commercial, and industrial customers in the same proportion as the contribution of each of these customer types to NV Energy's peak demand, in both southern and northern Nevada, based on the peak demand forecasts in the IRPs.

- **Impacts of rate design**: Unlike Navigant, Crossborder undertook an analysis of each NV Energy rate schedule to determine what portion of the total rate could be offset by on-site DG. Crossborder assumed that DG customers would not be able to avoid the portions of the total rate recovered through fixed customer or demand charges. This analysis used rate design data from NV Energy's most recent general rate case filings.

- **Retail rates escalation**: Crossborder used 2.5% annual escalation in NV Energy's retail rates, which is the utility's own assumption for retail rate escalation in its energy efficiency cost-effectiveness model. This is a slower growth in retail rates than Navigant's unrealistic assumption that retail rates will increase at the same rate as power supply costs. Navigant's assumption ignores the fact that fuel and purchased power costs comprise only a portion of the utility's costs.

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Crossborder Energy Analysis

Vote Solar, SEIA (formerly Solar Alliance), Hamilton Solar, and Bombard Electric commissioned Crossborder Energy Consultants to critique the study, and update the study if more appropriate assumptions were idenitfied.

- **Capacity Value**: In contrast to Navigant's study, NV Energy's current IRP reduces the utility's future need for capacity by a portion of installed DG capacity for small solar systems, indicating that NV Energy assumes that DG will avoid capacity-related costs. To be consistent with NV Energy's assumptions in its IRP, we have assumed that DG resources will avoid the same capacity-related costs that NV Energy assumes that demand response resources will avoid. These capacity-related avoided costs are relatively low in 2011-2014 as a result of NV Energy's present surplus of capacity, but then increase in the later years of the decade (Docket No. 10-02009, Volume 4, at 10-11 and Volume 5, at 141-143). Crossborder used the average output of DG resources during the NV Energy summer peak period as the measure of the avoided capacity benefits of DG. For example, the output of a fixed PV array in Las Vegas during the peak period averages 47% of the unit's installed capacity. This may be actually be conservative: in Colorado for example, Public Service Company of Colorado, assumes a 60-70% capacity credit for single-axis DG solar resources .
- **Emissions reduction value:** Crossborder added avoided emissions costs using the mid-CO_2 scenario from the NV Energy South IRP. We assumed 100% of NV Energy's emissions will be from burning natural gas. This may be a conservative assumption that understates the emission benefits, given Navigant's results showing that 10% to 20% of the fuel savings from DG are from reductions in coal-fired generation

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Crossborder Energy's Updated Analysis

Correcting for several of the perceived flaws in the cost/benefit methodology

Navigant findings:

Table 6. DG Savings and Net Costs ($/MWH)

Net Costs	2011	2015	2020
Total Cost of DG Output	$108	$184	$219
Less Savings for DG Benefits	$33	$63	$79
Net Cost to NV Energy Ratepayers	$75	$121	$141

Crossborder Energy findings:

Table 6: DG Savings and Net Costs ($/MWh)

Net Costs	2011	2015	2020
Total Cost of DG Output	$94	$103	$117
Less Savings for DG Benefits	$54	$107	$135
Net Cost or (Benefit) to NV Energy Ratepayers	**$39**	**($3)**	**($18)**

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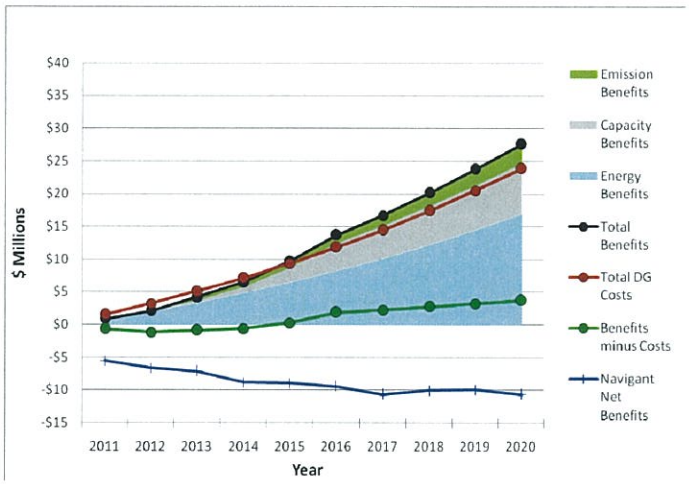
Crossborder Energy Analysis: DG Benefits and Costs at 1% Penetration



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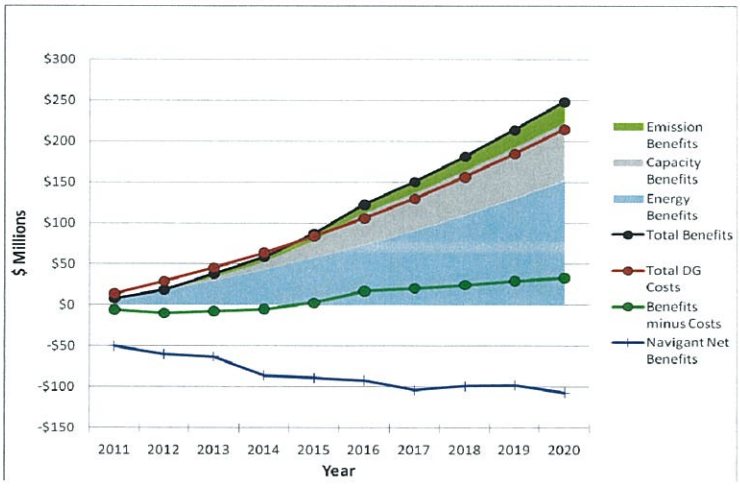
Crossborder Energy Analysis: DG Benefits and Costs at 9% Penetration



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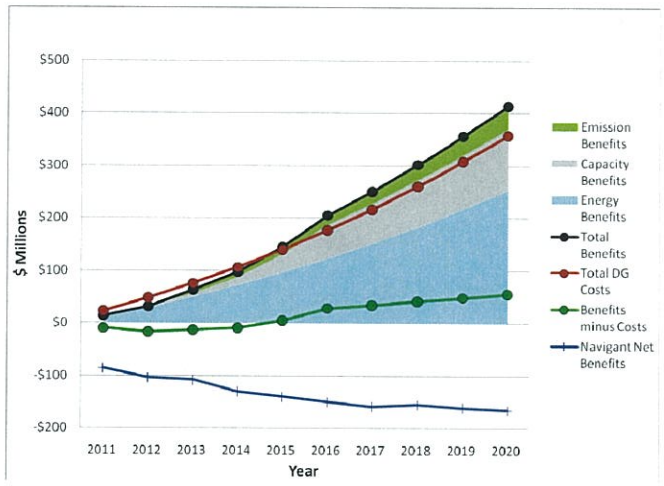
Crossborder Energy Analysis: DG Benefits and Costs at 15% Penetration



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Next Steps?

Follow Vote Solar's original suggestion in 2010 to have a PUC led net metering cost and benefit valuation effort, which will result in a 3rd party consultant updating the Navigant study. An ideal process would include:

a. A credible stakeholder process, where the utility is a partner at the table, but not controlling the process.

b. A requirement that the 3rd party consultant study the full range of benefits and costs as presented in slide 8.

c. Report back to the PUC within 3-6 months.

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Guiding Principles Going Forward…

- **Cover cost of service:** Rates should provide an opportunity for the utility to recover its cost of providing service and earn an adequate return for shareholders, while minimizing cost shifts among and within customer classes.

- **Properly valuing solar electricity, and adequately compensating solar customers:** Customer-sited solar generation offers many benefits to the electric grid system and by extension to non-solar customers, including but not limited to:
  - reduction in utility energy and capacity generation requirements, particularly during peak periods;
  - reduction in system losses;
  - avoidance or deferral of distribution and transmission investments;
  - localized grid support, including increase reliability benefits;
  - fuel-price certainty;
  - and reduction in air emissions and water use.

  The aforementioned benefits should be quantified, and solar customers should be adequately compensated for the value their solar energy is delivering to the grid.

- **Non-discriminatory practices within cost of service recovery**: Rates should provide an opportunity for the utility to recover its cost of providing service and earn an adequate return for shareholders, while minimizing cost shifts among and within customer classes.
  - Any utility charges created specifically for the purpose of recovering embedded fixed costs from net-metering customers should only recover *net* fixed costs, after accounting for all utility benefits and offsetting cost reductions due to the distributed solar.
  - Similarly, any utility *credits* created for the purpose of assuring that economic benefits resulting from the deployment of net-metered solar systems are properly assigned back to the net-metering customer(s) should only reflect *net* benefits, after accounting for all utility costs.

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Thanks for listening

THE Vote Solar INITIATIVE

Contact us with questions:
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