Comments Regarding the Committee Workshop on Distribution Infrastructure Challenges and Smart Grid Solutions to Advance 12,000 Megawatts of Distributed Generation

Docket Number 11-IEP-1G, 11-IEP-1H

The Solar Alliance appreciates the opportunity to provide the following comments on the topics addressed at the workshop held on June 22, 2011 regarding the distribution infrastructure challenges involved in implementation of Governor Brown's goal of deploying 12,000 MW of distributed generation (DG) in California by 2020. The Solar Alliance is a national alliance of solar photovoltaic (PV) manufacturers, integrators, and financiers dedicated to accelerating the deployment of solar electric power in the United States by promoting cost-effective state-based policies.

In this proceeding, the Solar Alliance has strongly recommended that the goal of 12,000 MW be split between an approximately equal mix of "customer-side" and "system-side" resources. Additionally, the Solar Alliance has recommended that the 12,000 MW goal be addressed on two parallel efforts; one establishing the market potential and the second identifying constraints to market growth. The first track – establishing the market potential – should focus on documenting the baseline of installed capacity and forecasting the potential growth from completing and extending existing programs. The agreement of stakeholders on the characteristics of the capacity to be installed is a prerequisite for identifying where the remaining capacity will be built. The second, parallel track should identify constraints to market growth resulting from non-programmatic barriers. These barriers include local policies, regulatory rules and/or technical constraints limiting DG, including interconnection issues associated with integration to the grid.

As part of the June 22 workshop, Navigant Consulting gave a presentation summarizing a study that was prepared for NV Energy in Nevada concerning the technical and economic impacts of increasing penetrations of distributed generation on the NV Energy system. The Solar Alliance notes that it disagreed with Navigant's analysis of the economic impacts of a high penetration of DG, and joined a group of DG stakeholders in Nevada that commissioned a detailed critique of Navigant's economic analysis. This critique was submitted to the Nevada Public Utilities Commission in January 2011, and is provided in Attachment A for the record in this docket. Accordingly, in assessing the points raised in the Navigant presentation, and to the extent the Commission intends to use any of the Navigant's analysis in its assessment of the feasibility of increased DG interconnection in California, the Solar Alliance would respectively request that the Commission take into account the appended critiques which identifies several deficiencies in Navigant's analysis.

The Solar Alliance appreciates the opportunity to submit written comments on this topic.

Critique of Navigant's Distributed Generation Study for NV Energy

Prepared by: Crossborder Energy
January 27, 2011

Principal Authors: R. Thomas Beach
Patrick G. McGuire

Introduction

This report reviews the economic analysis that Navigant Consulting, Inc. prepared for NV Energy of the rate impacts of increased penetrations of distributed generation (DG) on NV Energy's electric system in Nevada. Navigant released this study on December 30, 2010. NV Energy asked Navigant to prepare this study in response to a draft Compliance Order from the Public Utilities Commission of Nevada (PUCN) in Docket No. 10-04008, directing NV Energy to determine how DG can impact its system performance, reliability, distribution operations, and electricity rates.

The Navigant study first reviews the technical aspects of increased DG penetration on the NV Energy distribution system, and concludes, on page 8, that "NV Energy's distribution system alone does not limit the amount of DG that can be installed within existing operating limits." However, Navigant recommends that the impacts of increased DG penetration on NV Energy's bulk transmission grid should be studied, particularly in conjunction with NV Energy's plans to add significant amounts of utility-scale renewable projects. NV Energy is planning a further study of such grid impacts.

Navigant concludes its study with an economic analysis of the impacts of increased amounts of DG on NV Energy's ratepayers. Navigant concludes that the benefits of DG, principally fuel savings and emission reductions, are far less than the costs to ratepayers from NV Energy's lost revenues, thus creating, in Navigant's words on page 44, "a potential subsidy to DG owners."

This report provides a critique of Navigant's economic analysis. Navigant does not present a realistic scenario for an increasing penetration of DG resources on the NV Energy system over the next decade; the report appears to assume that the full penetration of DG is achieved in the first year. By its own admission, Navigant's analysis of the revenues lost to DG does not consider the detailed structure of NV Energy's retail rates, and Navigant escalates retail rates at a much higher rate than NV Energy itself uses. Navigant also fails to calculate the benefits of DG using avoided costs consistent with those used in NV Energy's current Integrated Resource Plans (IRP), as filed in PUCN Dockets Nos. 10-02009 and 10-07003. In particular, Navigant minimizes the capacity benefits of DG, even though NV Energy's IRPs assume that DG will reduce future system peak demands. Crossborder Energy presents in this report a revised analysis which corrects these flaws, and which concludes that the long-term benefits of DG in Nevada over the next ten years will exceed the costs, thus reducing rates for NV Energy's ratepayers.

Problems with the Navigant Study

Crossborder Energy's review of the Navigant study has identified the following significant issues with Navigant's economic analysis of an increased penetration of DG on the NV Energy system.

- 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).

- Navigant states that it was beyond the scope of its economic analysis to assess the impacts of NV Energy's retail rate design.[1] In practice, even if behind-the-meter DG is net metered, a retail customer who installs DG will have difficulty avoiding fixed customer or demand charges. This significantly reduces the lost revenues that are the principal cost of DG to non-participating ratepayers.

- Navigant assumes that NV Energy's overall rates will increase at the same rate as the utility's power supply costs.[2] 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.

- 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.

Crossborder's Analysis

Crossborder has completed its own analysis of the rate impacts of 1%, 9%, and 15% penetrations of DG on NV Energy's system by 2020. In performing this analysis, Crossborder addresses each of the above issues. In this work, we have used assumptions

---

1 Navigant, at 41, footnote 31.

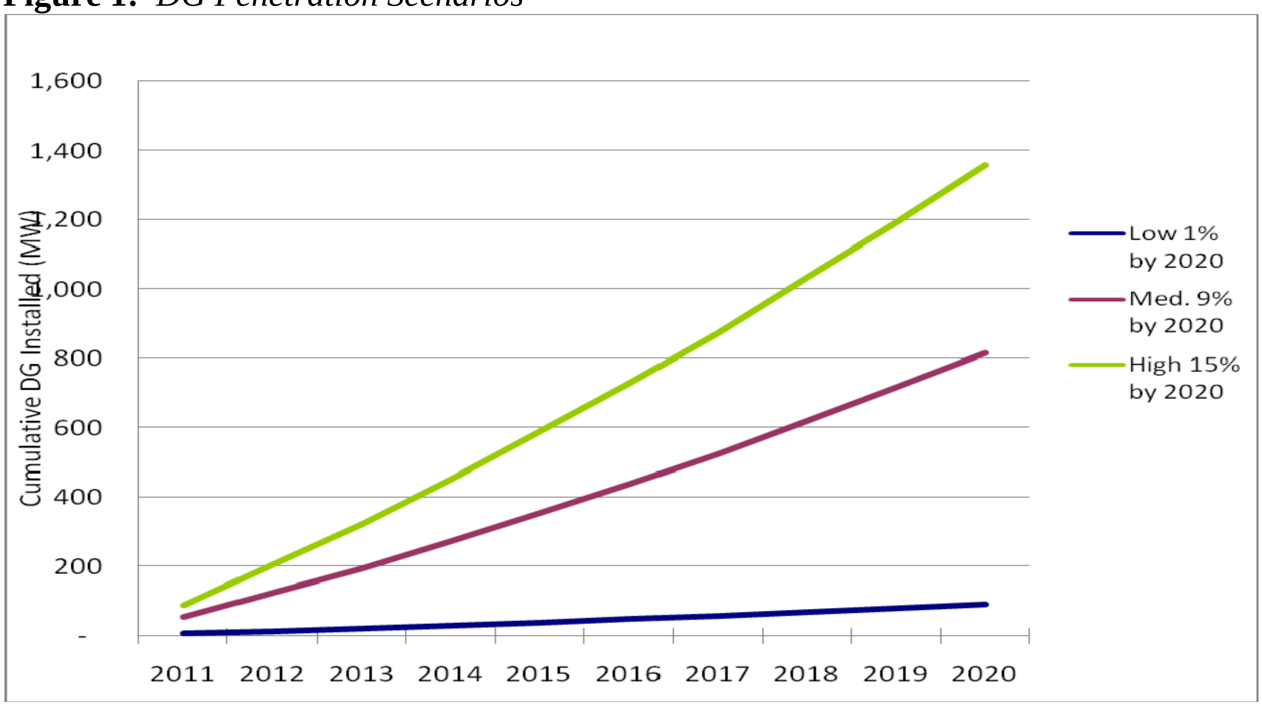
2 Navigant, at 41.

taken directly from NV Energy's current IRPs, as filed with the PUCN on February 1 and July 1, 2010. Crossborder has used its own assumptions only for those parameters which depend on changing market conditions, such as the forward curves for energy in NV Energy's northern and southern Nevada service territories. The key elements of Crossborder's analysis are described in more detail below.

DG Penetration. Navigant's analysis states that it examined 1%, 9%, and 15% penetrations of DG resources in 2020.[3] One would expect DG penetration, as a percent of peak demand, to increase slowly over the decade, such that the penetrations in the early years of the decade are well below the target 2020 penetration. This is what is shown in Navigant's Figure 6. However, Navigant's subsequent analysis of DG costs and benefits, summarized in Figures 20-22, shows very large costs **in the first year**. For example, Figure 22 shows about $125 million in costs **in 2011** in the 15% DG penetration scenario. The only way that DG costs could be so large in 2011 is if hundreds of MWs of new DG are assumed to come on-line immediately in 2011. Navigant appears to have assumed that the target penetration is achieved in the first year (2011), instead of in the final year (2020). This is not a realistic trajectory for achieving the target penetrations of DG resources.

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. The resulting trajectories for DG development are shown in Figure 1.

Figure 1: *DG Penetration Scenarios*



---

[3] Navigant, at 2 and 10; also, Figure 6.

Costs of DG. The principal costs of an expanded penetration of DG are the revenues that NV Energy would lose from DG directly serving customers' loads. We have assumed the same distribution of DG used by Navigant, including:

- In northern Nevada, 70% of the installed DG capacity are solar photovoltaic (PV) systems. The penetration of PV in southern Nevada is 90%. The remaining DG capacity is wind.
- 20% of wind DG are small systems serving residential customers. The other 80% are larger installations for commercial and water pumping customers.[4]

The Navigant study does not state how the PV capacity is allocated among NV Energy's customer classes. We 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. We further assumed that residential and commercial PV DG systems use fixed arrays, while industrial systems employ single-axis tracking. The National Energy Renewable Laboratory's (NREL) PVWATTS calculator and Western Wind Dataset were the sources for hourly and annual generation estimates for representative PV and wind systems in both southern and northern Nevada.[5] The assumed DG generation, per kW of installed DG capacity, is summarized in Table 1.

Table 1: *DG Generation (Annual kWh per kW)*

	Southern Nevada	Northern Nevada
Fixed Array PV	1,989	1,837
1-axis Tracking PV	2,595	2,402
Small Wind (residential)	1,927	1,664
Large Wind (commercial)	3,066	3,066

Unlike Navigant, we undertook an analysis of each NV Energy rate schedule to determine what portion of the total rate could be offset by on-site DG. We 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.[6] The results of this analysis are summarized in Table 2 below.

---

4 Navigant, at 11.

5 See http://rredc.nrel.gov/solar/calculators/PVWATTS/version1/ and http://www.nrel.gov/wind/integrationdatasets/western/methodology.html .

6 For Northern Nevada, see Volume 4 of the June 1, 2010 NV Energy North Electric GRC (Docket No. 10-06001), at page 105 of 172). available at http://www.nvenergy.com/company/rates/filings/images/Volume4of14StatementsItoQ.pdf . For Southern Nevada, see Volume 8 of the NV Energy South 2008 GRC (Docket No. 08-12002), at page 24 of 229, available at http://www.nvenergy.com/company/rates/filings/images/Volume8-RateDesign.pdf . We also used information from NV Energy's current tariffed Statements of Rates.

Table 2: *Percent of Retail Rate Offset by DG*

	Southern Nevada	Northern Nevada
Residential	94%	87%
Commercial	78%	77%
Industrial	71%	82%

Finally, we 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.[7] 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.

Based on the above assumptions, we estimated NV Energy's lost revenues in each year from 2011 to 2020 as a result of the addition of DG. These lost revenues are the principal costs of DG. We added to the lost revenues the one-time distribution system costs that Navigant estimated in Figures 18 and 19. The total costs of DG are shown by the red lines in Figures 2-4, for 1%, 9%, and 15% penetrations of DG in 2020.

Benefits of DG. Our principal concern with Navigant's calculation of the benefits of DG is its exclusion of capacity-related benefits. Navigant appears to justify its exclusion of such benefits by asserting that NV Energy's system peaks from 7 to 8 p.m., when solar DG output will be low and declining.[8] The following table shows the demands, dates, and times of NV Energy's recent system peaks in both southern and northern Nevada, based on FERC Form 714 data, showing that Navigant's assertion is not correct.

Table 3: *Recent NV Energy System Peaks (MW, date, hour)*

	Southern Nevada	Northern Nevada
2007	6,332 7/5/08 1700	2,084 7/5/07 1700
2008	5,934 7/10/08 1600	1,986 7/8/08 1800
2009	5,999 7/28/09 1600	1,911 7/27/09 1700

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.[9] 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-

---

7 Docket No. 10-02009, Volume 9, at 83.

8 Navigant, at 33.

9 Docket No. 10-02009, Volume 4, at 10-11 and Volume 5, at 141-143.

2014 as a result of NV Energy's present surplus of capacity, but then increase in the later years of the decade.[10]

Our analysis does not calculate avoided capacity benefits based on the full installed capacity of a DG resource, because renewable DG resources typically are not operating at full capacity during peak hours. We have used the average output of DG resources during the NV Energy summer peak period as the measure of the avoided capacity benefits of DG.[11] For example, the output of a fixed PV array in Las Vegas during the peak period averages 47% of the unit's installed capacity.

Given that energy markets are volatile, and that time has elapsed since NV Energy's IRP filings, Crossborder has developed its own hourly forward curves for NV Energy's marginal energy costs in both northern and southern Nevada from 2011-2020. This projection uses the profile of NV Energy's recent historical system lambda data, from FERC Form 714, combined with current forward market prices from the electricity and natural gas markets located in close proximity to both of NV Energy's service territories. We then applied these forward curves to the assumed hourly output of the DG resources, and included 6% line losses, which is consistent with the avoided line losses that the utility assumes in its IRP for behind-the-meter resources.[12]

Finally, we 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.[13]

Figures 2 – 4 show the results of Crossborder's analysis of the costs and benefits of DG for NV Energy's ratepayers, for DG penetrations of 1%, 9%, and 15% in 2020. The shaded areas in the figures show the benefits from avoided energy costs (fuel savings and line losses), avoided capacity costs, and avoided emissions. The red line plots the total costs of DG, both lost revenues and the one-time distribution system costs that Navigant identified. The green line shows the net benefits (or costs if below zero).

---

[10] Docket No. 10-02009, Volume 9, at 83. Navigant's study does not include any sensitivity analyses on the assumed load growth forecast. While the immediate future may show little load growth as a result of the recession, this may change as economic conditions improve. If NV Energy's service territories resume the rapid load growth that Nevada has seen in the past, that could shift NV Energy's need for new resources forward in time, and thus increase the capacity-related benefits of DG. In fact, NV Energy's prior IRP filing in 2009 included much higher avoided capacity-related costs in 2010-2014. Docket No. 09-07003, Volume 8, Book 1, at 41.

[11] This is a standard approach to calculating the capacity credit for intermittent renewables. See North American Electric Reliability Corporation (NERC), "Accommodating High Levels of Variable Generation," a special report of NERC's Integration of Variable Generation Task Force (April 16, 2009) at 39-40.

[12] Docket No. 10-02009, Volume 9, at 83.

[13] Navigant, at 31-32 and Figure 14.

Figure 2: *DG Benefits and Costs at 1% Penetration*

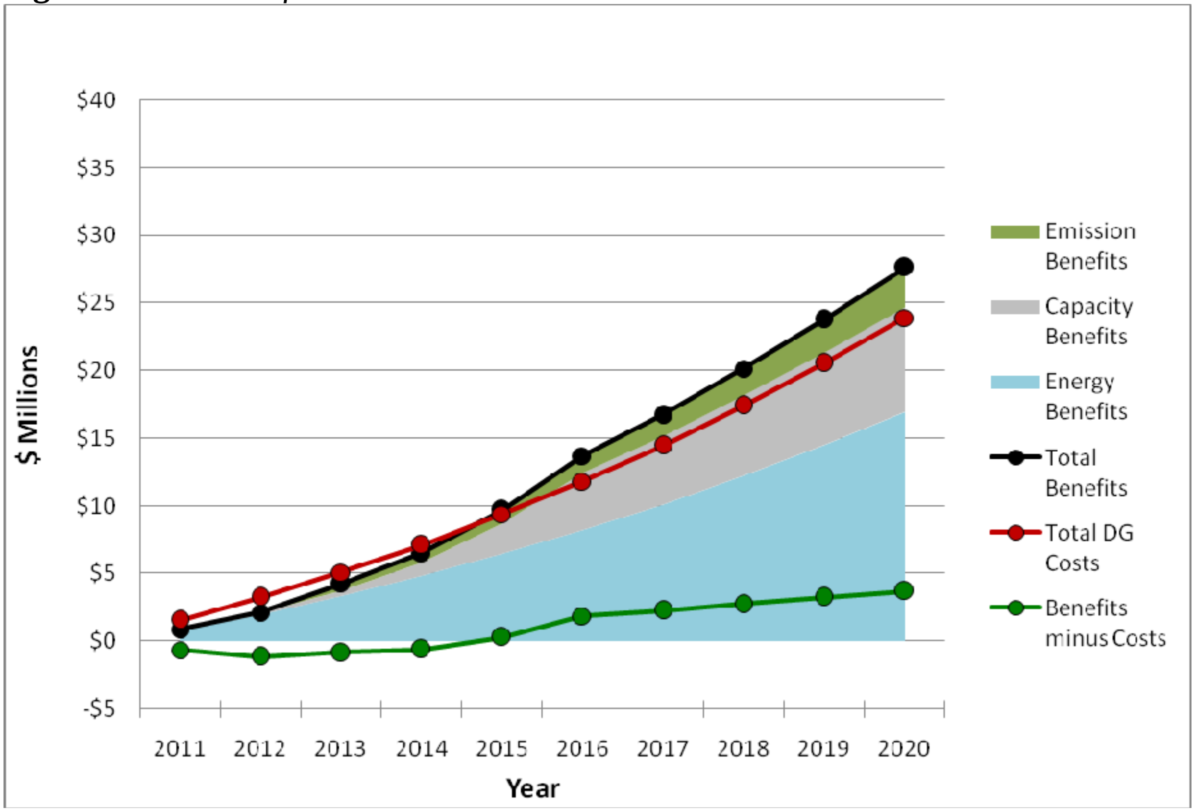


Figure 3: *DG Benefits and Costs at 9% Penetration*

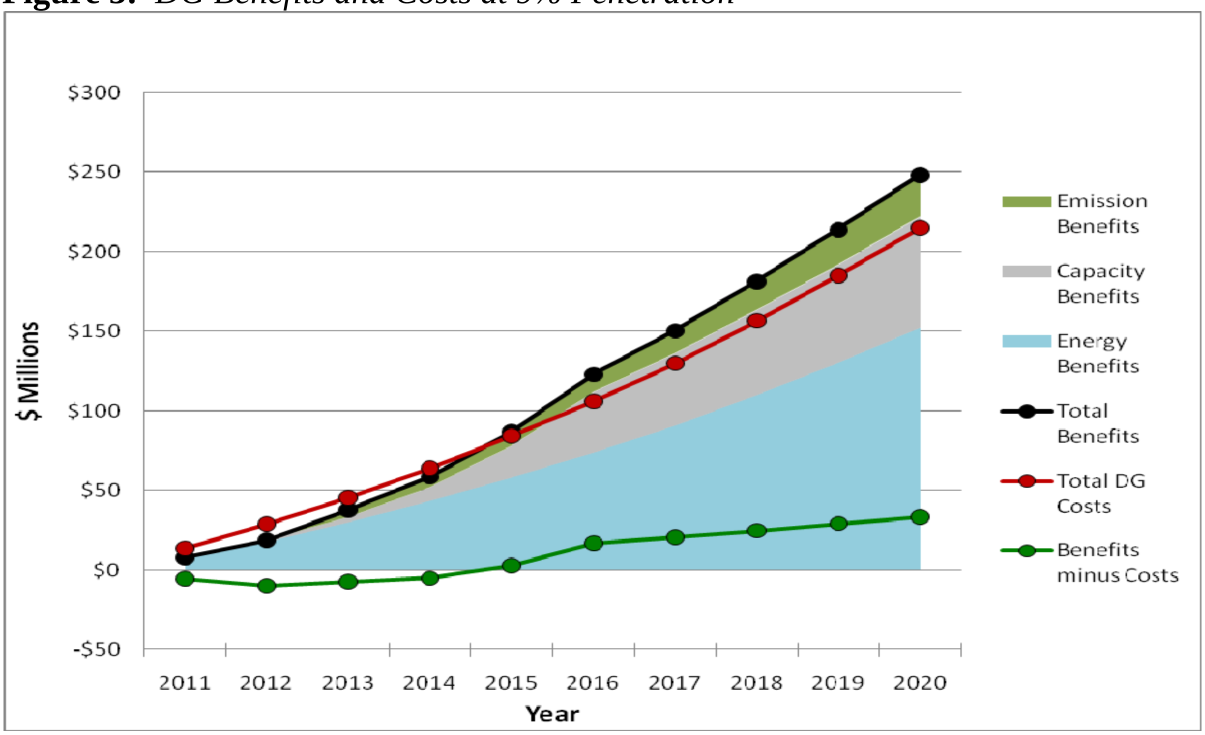
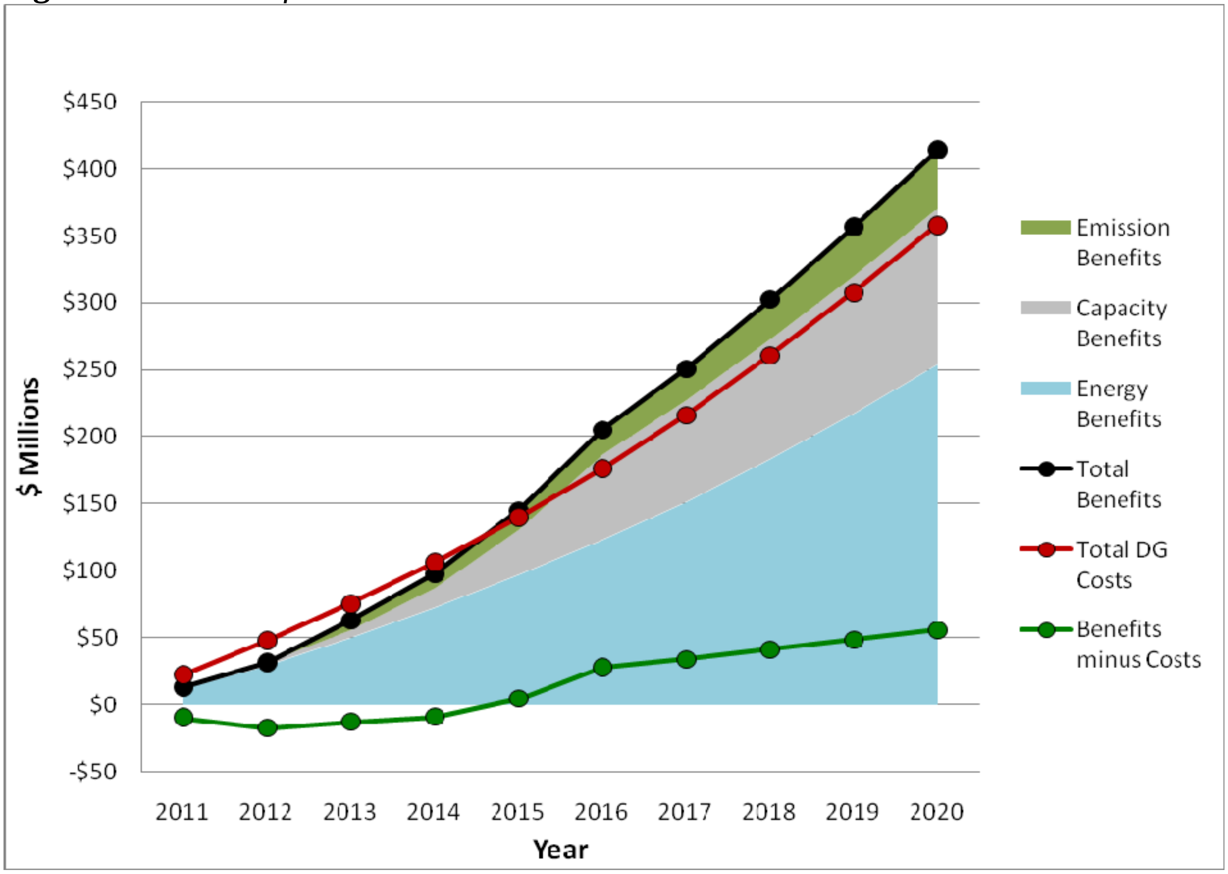


Figure 4: *DG Benefits and Costs at 15% Penetration*



Key Findings and Conclusions. Crossborder's analysis shows that, although the costs of DG on the NV Energy system will exceed the benefits from 2011 until 2014, after 2015 the benefits will exceed the costs by increasing amounts. As a result of the small amounts of DG that would be installed over the next several years, any potential subsidy of DG by other ratepayers in these years will be relatively minor. As the amount of installed DG increases after 2014, the benefits of DG begin to exceed the costs. In the later part of the ten-year period, the capacity benefits of DG contribute significantly to the overall benefits of DG. Over the full decade, NV Energy's ratepayers will benefit from increasing amounts of DG installed on the utility's system.

Finally, it is important to emphasize that Navigant's analysis of the costs and benefits of DG from the perspective of NV Energy's ratepayers is only one of the cost/benefit perspectives that regulators should consider in evaluating whether to adopt policies supportive of DG development. The Navigant study acknowledges that it did not consider the merits of DG from the perspective of a customer that installs DG.[14] The PUCN also should consider a cost/benefit analysis of DG from a broader societal or "total resource cost" perspective, comparing the resource costs of installing DG to the societal benefits that result from the installation of clean generation that can serve customer loads directly. Nevada has adopted a total resource cost test as the principal means to evaluate

14 Navigant, at 1 and 30.

the cost effectiveness of utility energy efficiency and demand side management programs,[15] and states such as California have adopted the total resource cost perspective to evaluate programs that encourage the development of DG resources.[16]

---

15 See, for example, Docket No. 10-02009, Volume 9, at DSM-1 and 77-79. Similarly, in its IRPs, NV Energy is required to do a Present Worth of Societal Costs analysis, including environmental externalities and economic development benefits, which includes many of the elements of the broader total resource cost test.

16 CPUC Decision No. 09-08-026, "Decision Adopting Cost-Effectiveness Methodology for Distributed Generation.," dated August 20. 2009.