E3 Nevada NEM Study

Overview for New Energy Industry Task Force

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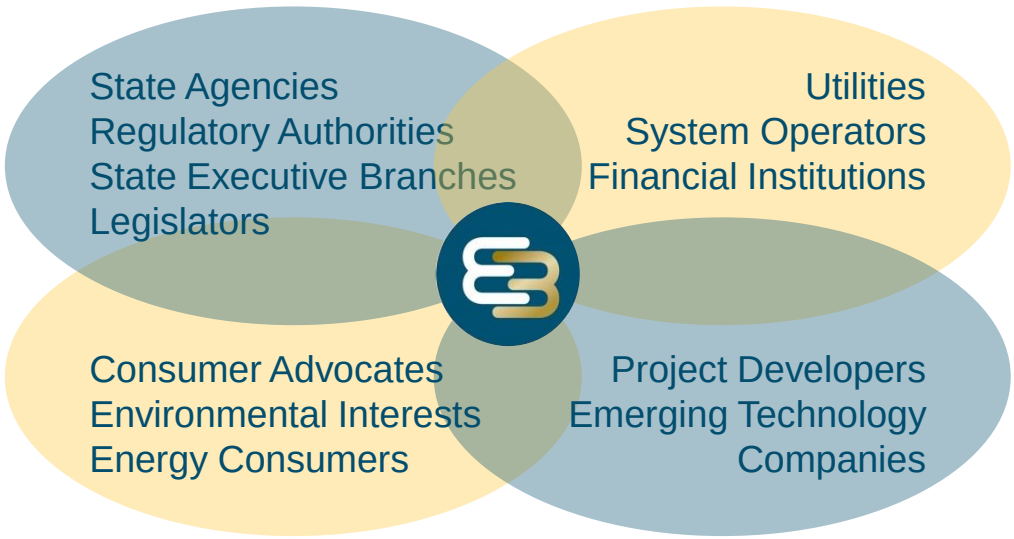
Energy+Environmental Economics

About E3

- Founded in 1989, E3 operates at the nexus of

- 40 professional staff located in San Francisco, CA composed of
  - Economists
  - Engineers
  - Resource planners
  - Public policy experts
- E3 staff bring a deep understanding of analytical techniques and electricity industry economics to solve high-level problems for a wide variety of clients



Nevada NEM Study Overview

- E3 commissioned by PUCN in 2014 to forecast the **costs and benefits of NEM in Nevada** in response to Nevada AB 428
- Study completed under direction of PUCN with regular input throughout the process from a stakeholder advisory group including
  - PUCN staff
  - Utility
  - Solar industry
  - Ratepayer advocates
- Study completed using publically available data where possible with a publically available analysis tool (some confidential utility data redacted)
- Funded by the National Association of Regulatory Commissioners (NARUC)

PUCN

NVEnergy
A MIDAMERICAN ENERGY HOLDINGS COMPANY

SEIA™

and many others…

Key Study Questions

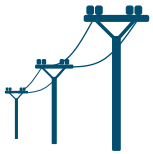
Costs and benefits of NEM in Nevada calculated from five perspectives using an industry standard approach

- **Participant**
  - + Bill credits & subsidies
  - - Installation cost
  - = Cost-effectiveness

Is NEM cost-effective for the customers who install systems?

- **Non-Participating Ratepayer**
  - + Utility avoided costs
  - - Bill credits & subsidies
  - = Cost-effectiveness

Does NEM raise or lower rates for other customers?



- **Program Administrator (Utility)**
  - + Utility avoided costs
  - - Integration and program costs
  - = Cost-effectiveness

Does total bill revenue collected increase or decrease?

- **State of Nevada**
  - + Utility avoided costs
  - - Installation cost
  - = Cost-effectiveness

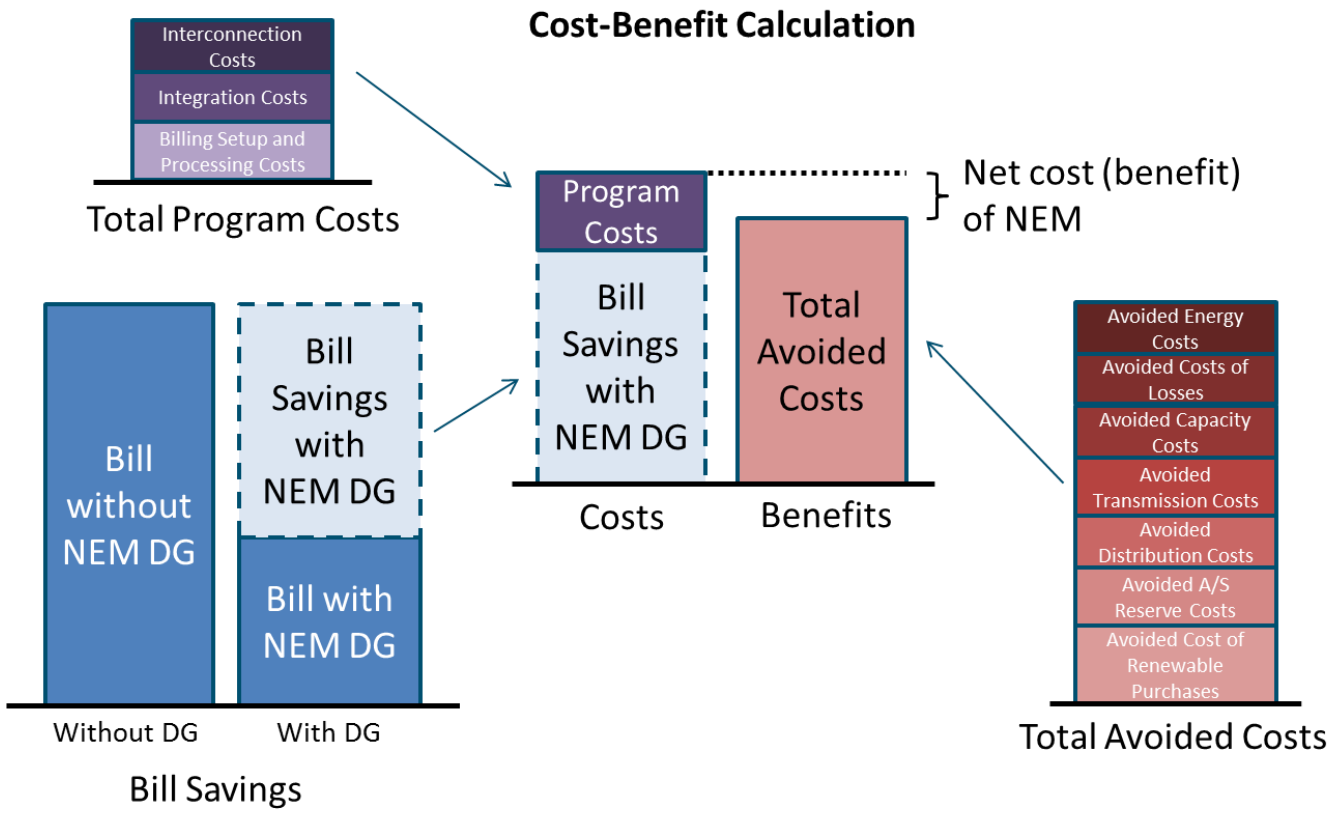
Is NEM a cost-effective resource for Nevada?

- **Society**
  - + Utility avoided costs & societal benefits
  - - Installation cost
  - = Cost-effectiveness

Is NEM a cost-effective resource when including societal benefits?

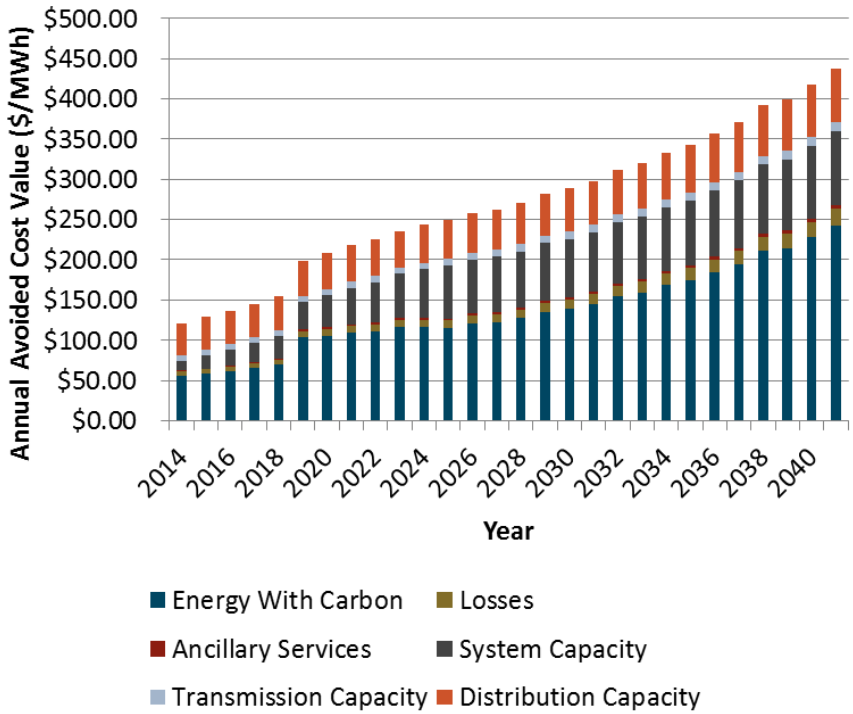
Ratepayer Impact Measure (the 'RIM' test)

- NEM provides value to the utility by reducing energy purchases, new power plant purchases, etc… these are known as **avoided costs**
- If the **bill savings** to NEM customers exceed **avoided costs**, there is a **cost-shift** that raises rates to non-participating customers

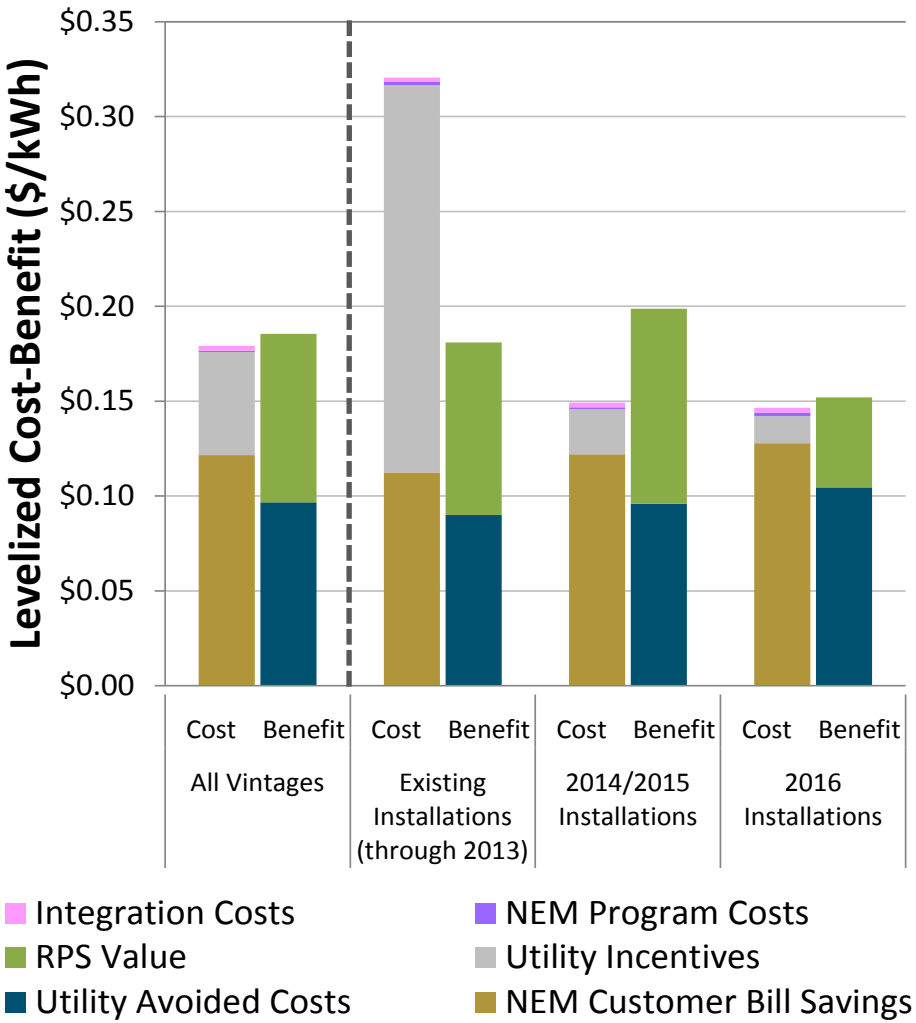


Input Assumptions and Major Sources

- Results are driven by study assumptions
- Used resource plans developed at the PUCN in 2012 and 2013
- NV Energy provided utility avoided cost data
- A number of factors have since changed which would impacts study results
  - Senate Bill 123
    - Coal retirements
    - New build of both renewable and conventional generation
  - Market developments
    - Natural gas price decline
    - Solar price decline



Ratepayer Impact Measure Results – Base Case



E3 separated NEM customers into three vintage categories

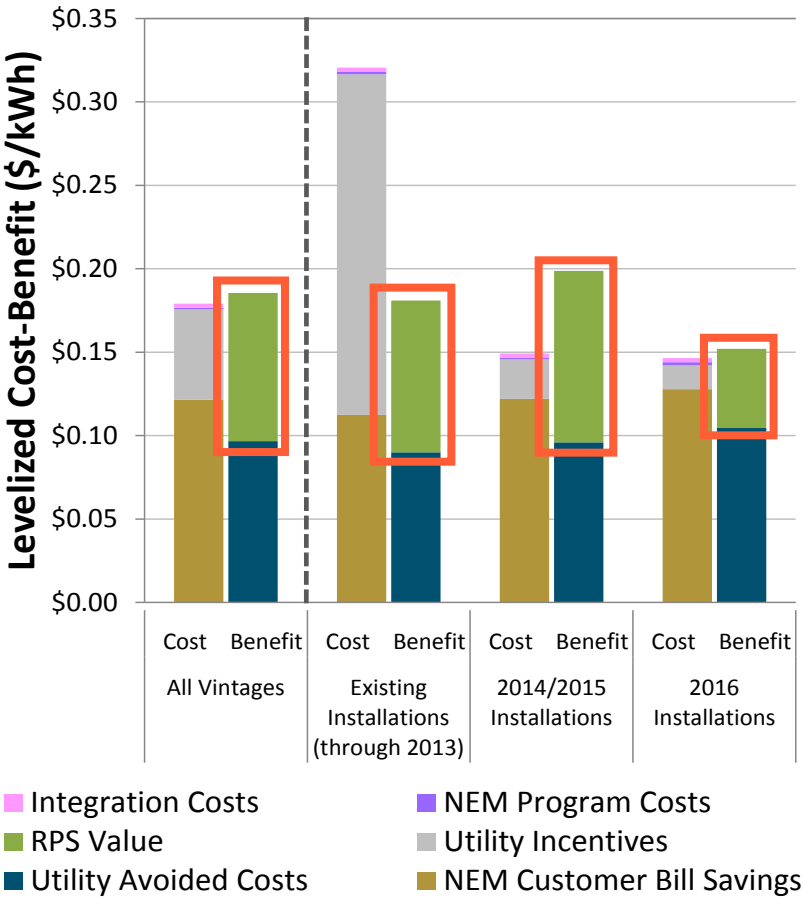
1) Installations through 2013
   - Policy and incentives in 2013

1) 2014/2015 vintage
   - Incentives reduced in 2014

1) 2016 vintage
   - RPS 'multiplier' reduced in 2016

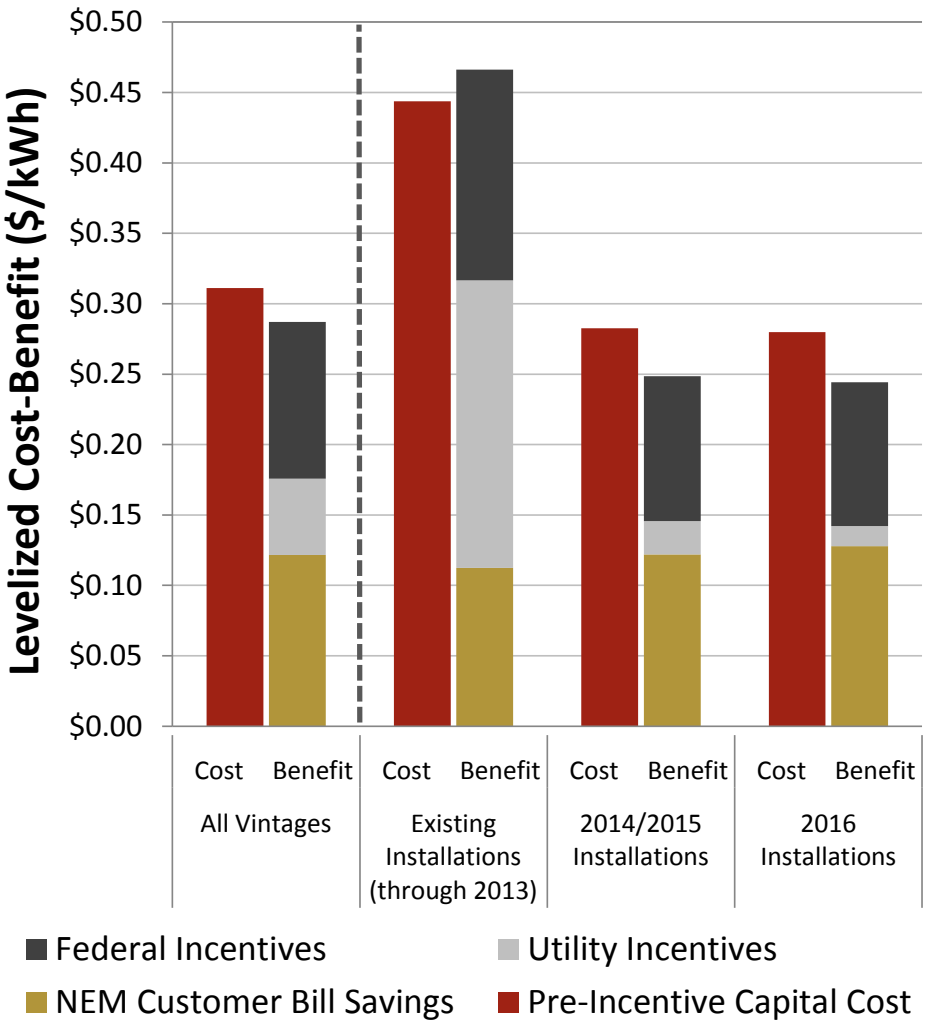
E3 forecasts a cost-shift for existing systems, but a net benefit to ratepayers for systems installed after 2014

RPS Value



- Incentivized NEM generation counts towards RPS in NV
  - For systems built before 2016, every MWh of generation counts as 2.45 RPS credits
  - NEM also reduces the RPS compliance obligation by reducing net load (obligation: 25% of all generation by 2025)
  - Result: 1 MWh of NEM PV generation in 2015 can be banked until 2020, when it can replace almost 2.7 MWh (2.45 + 0.25) of utility-scale PV generation
  - Note: this value only applies in future years when NV Energy needs to procure renewable energy for compliance (> 2020)
    - SB 123 could change these results

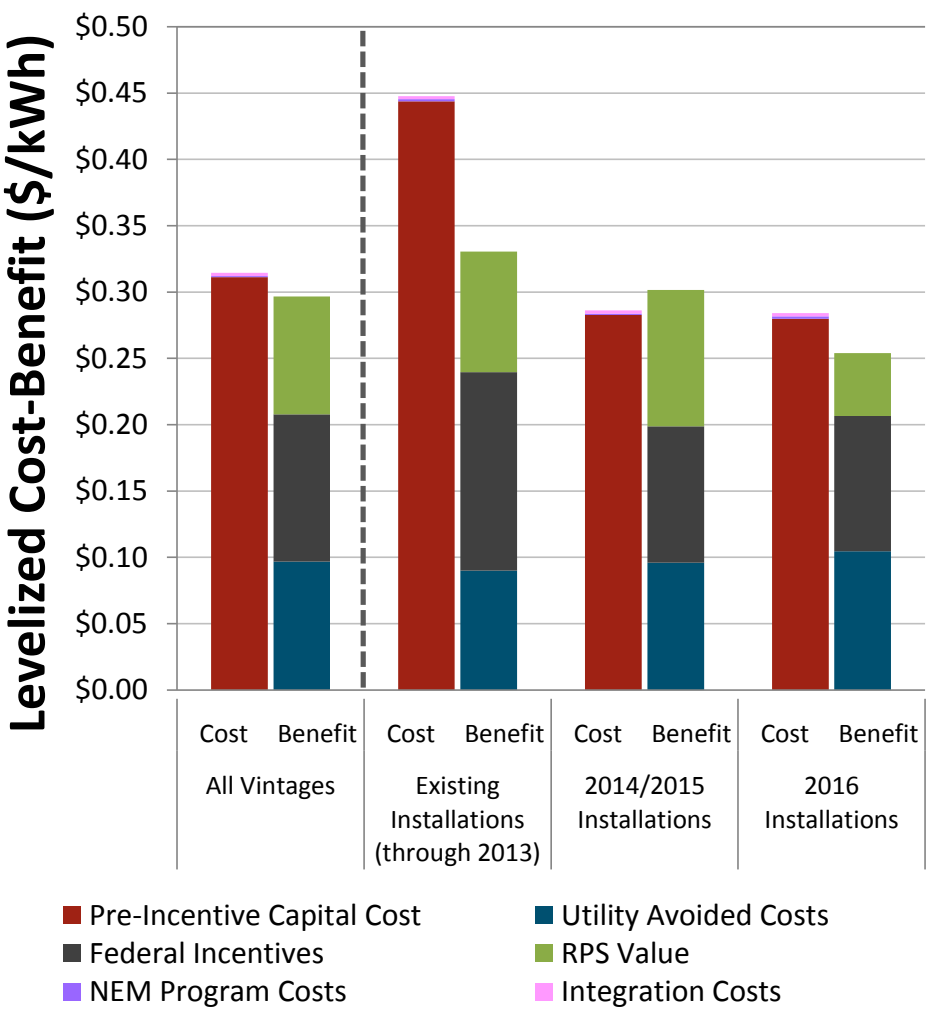
Participant Cost Test Results – Base Case



Installing a NEM system was historically beneficial to the average participant

Based on solar cost forecasts at the time of the study, NEM is not cost-effective for participants in 2014 and beyond

Total Resource (Nevada) Cost Test – Base Case



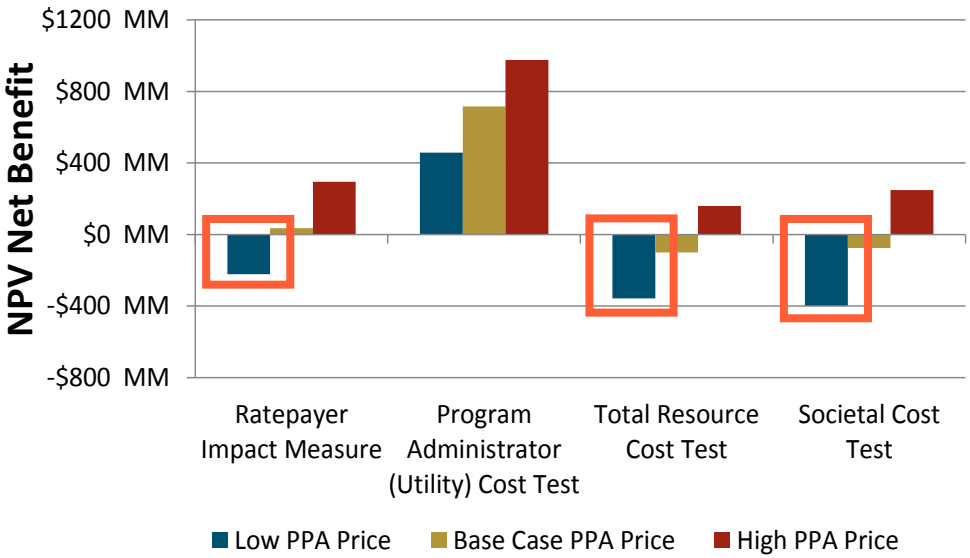
Overall, NEM installed through 2016 will cost NV about $100 million or $0.02/kWh

With the RPS multiplier, 2014/2015 NEM installations save NV money

Note - adding emissions related externalities adds more costs because NEM reduces total installed renewable capacity

Sensitivity Results - Utility-Scale Solar Price

	Utility-Scale Renewable PPA Price
Low	$80/MWh
Base Case	$100/MWh
High	$120/MWh



The cost of utility-scale solar impacts the cost-effectiveness of NEM significantly since NEM avoids purchases of additional utility-scale solar

Actual publicly released costs of utility scale solar are less than $50/MWh for utility scale solar

Based on these contracts, the 'Low PPA' price sensitivity is more appropriate than the base case assumption

What Has Changed Since the Study?

Many changes have occurred since the study

We don't currently know the magnitude of each change or the net impact of all changes combined

↑ benefits increase relative to costs
↓ costs increase relative to benefits

Ratepayer Perspective	Nevada/Societal Perspective	
↑	n/a	New NEM tariffs
↑	↑	SB 123: 800 MW of coal retirements
↓	↓	SB 123: 350 MW of additional renewable capacity (+200 MW conventional)
n/a	↑	Continued dramatic decreases in cost of solar (utility-scale and NEM)
↓	↓	Decrease in natural gas prices
?	?	Other utility resource planning changes

Contact Information

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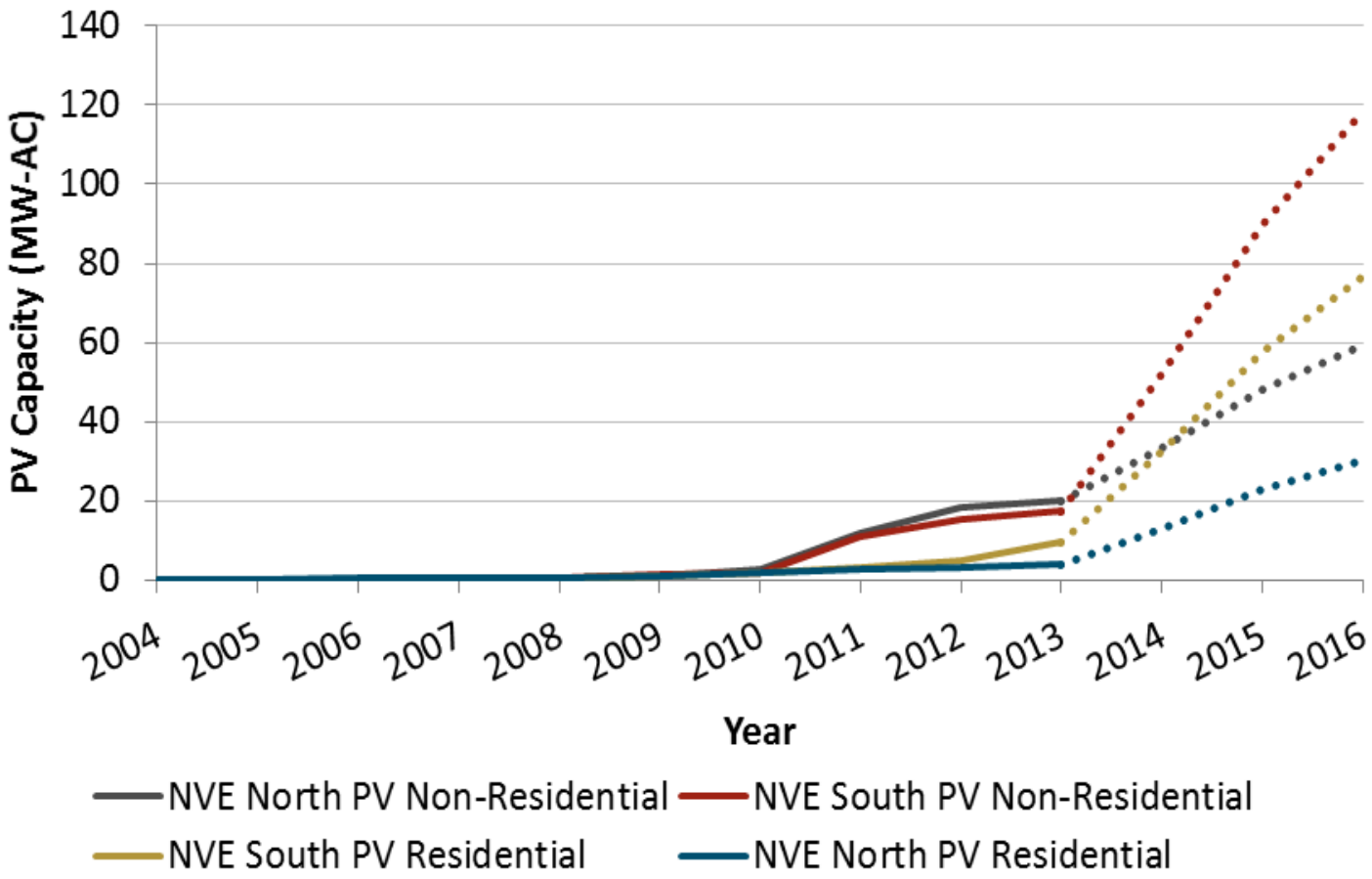
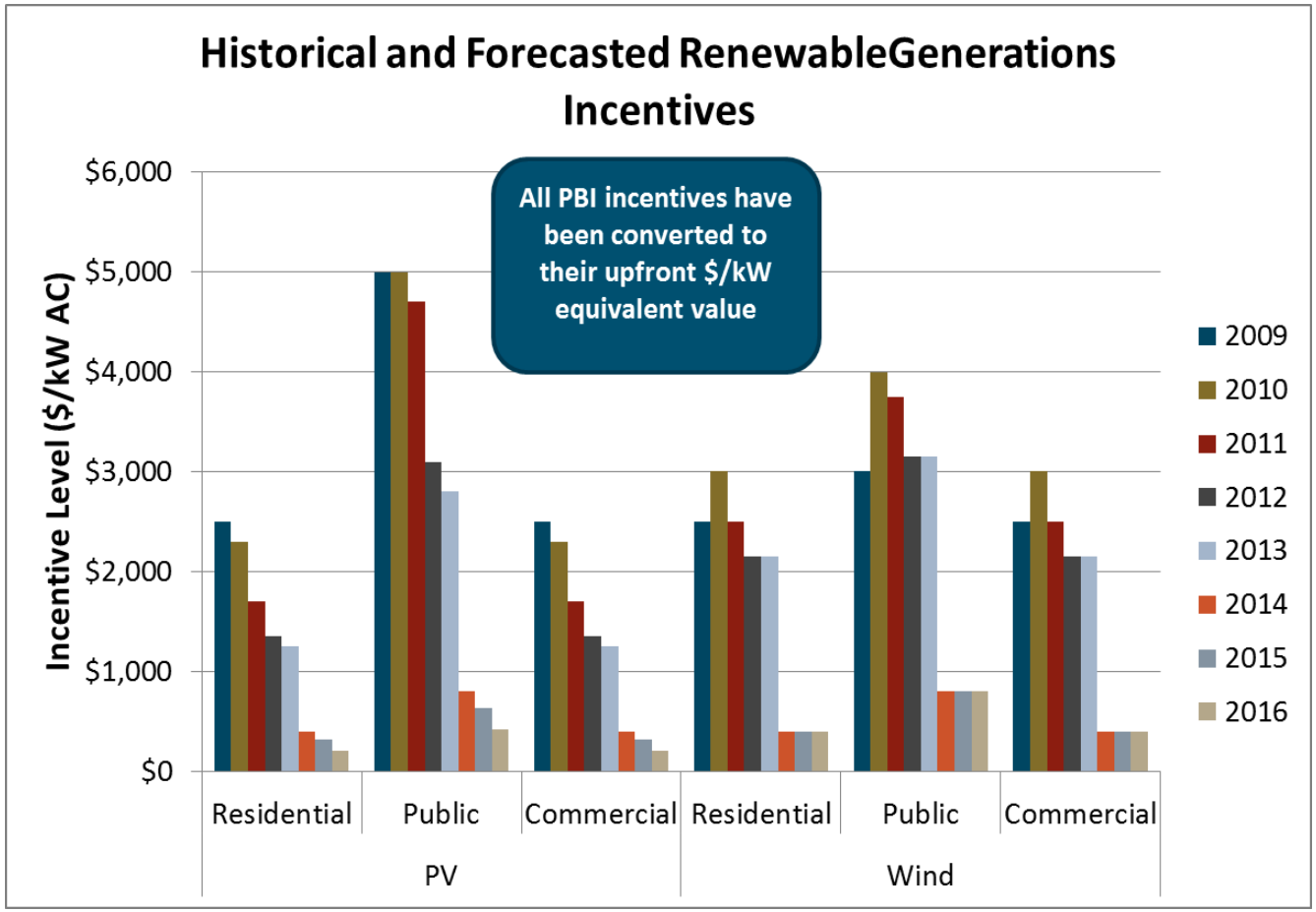
Appendix

NEM PV Forecast



NV NEM Subsidies



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Detailed Base Case Results

Participants

Benefit (cost) to customers who participate in NEM	Installs through 2013	Installs in 2014-2015	Installs in 2016	All installs through 2016
Lifecycle NPV ($Million 2014)	$23	($115)	($43)	($135)
Levelized ($2014/kWh)	$0.02	($0.03)	($0.04)	($0.02)

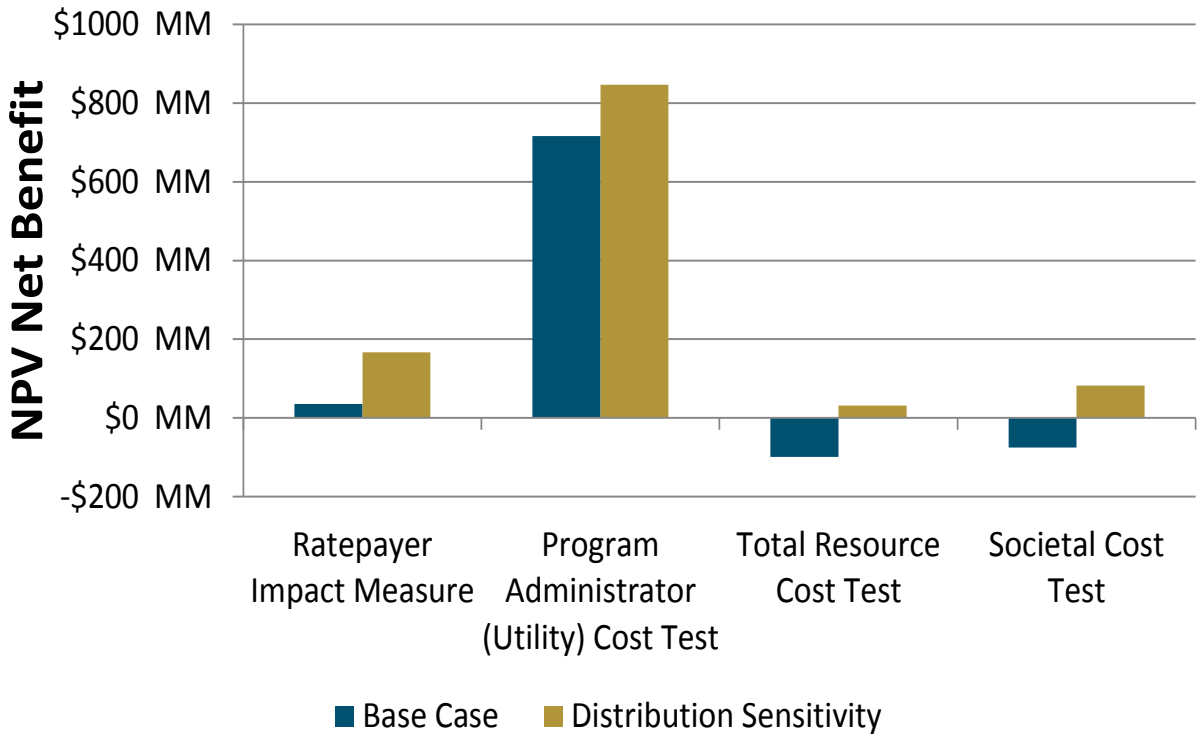
Ratepayers

Benefit (cost) to non-participating ratepayers	Installs through 2013	Installs in 2014-2015	Installs in 2016	All installs through 2016
Lifecycle NPV ($Million 2014)	($141)	$168	$6	$36
Levelized ($2014/kWh)	($0.14)	$0.05	$0.01	$0.01

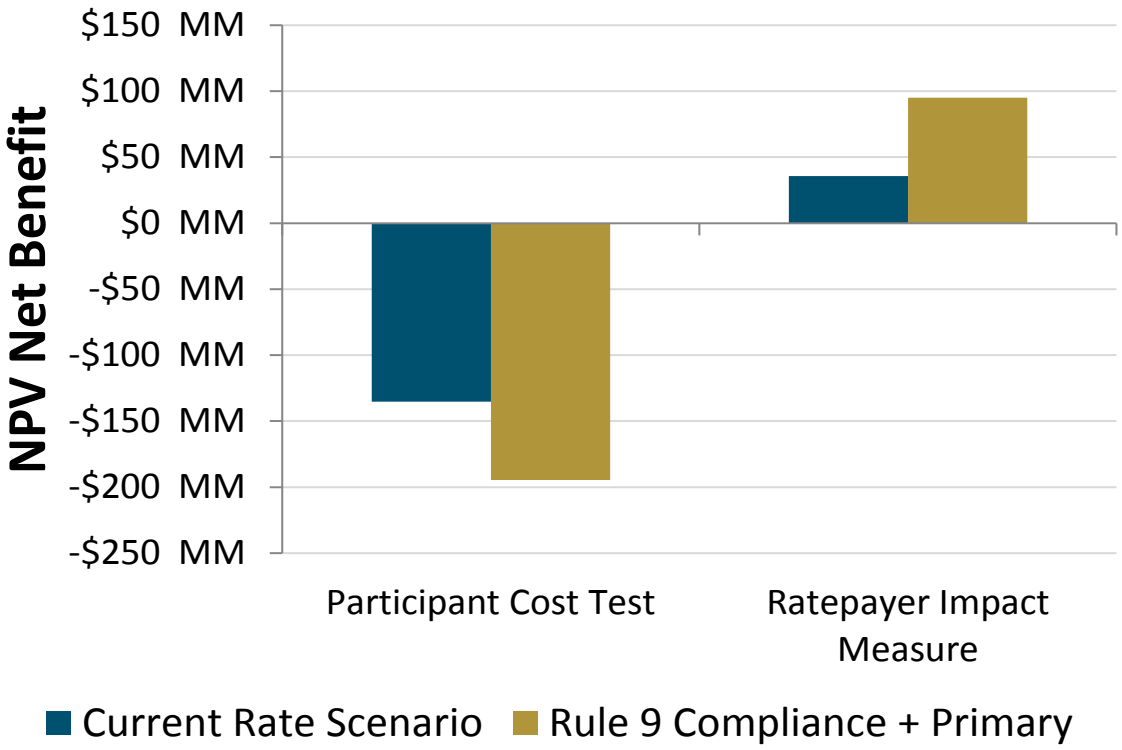
Nevada

Benefit (cost) to the state of Nevada, including externalities	Installs through 2013	Installs in 2014-2015	Installs in 2016	All installs through 2016
Lifecycle NPV ($Million 2014)	($133)	$90	($36)	($75)
Levelized ($2014/kWh)	($0.11)	$0.02	($0.02)	($0.01)

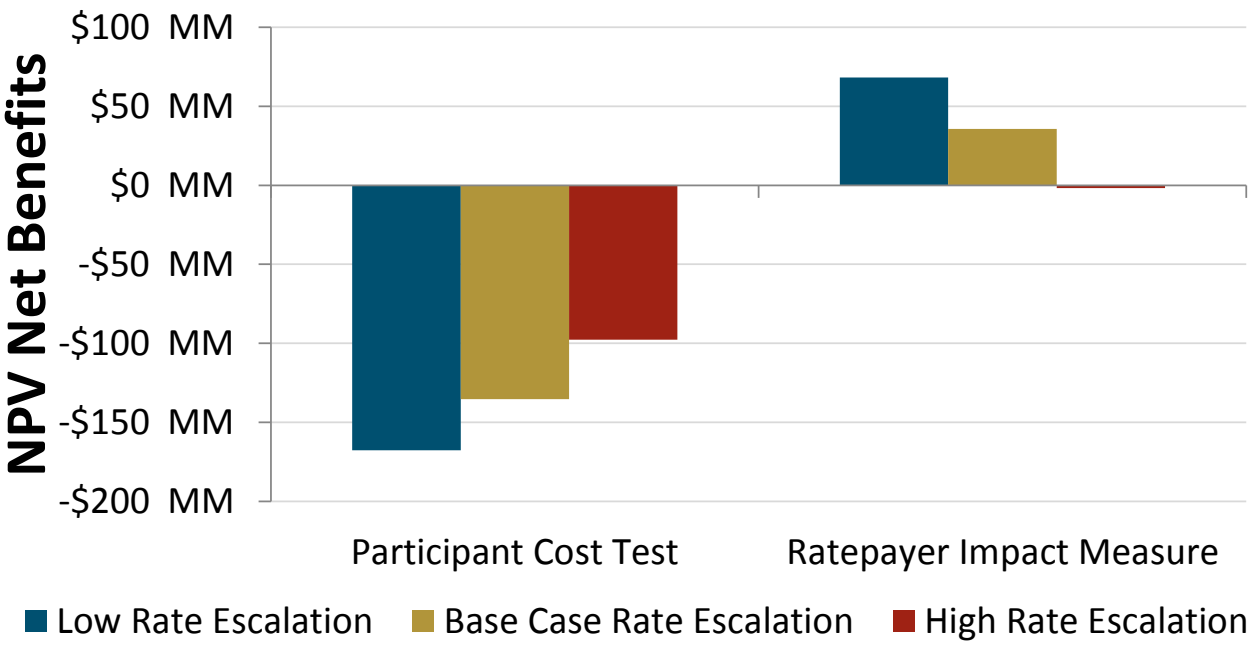
Distribution Sensitivity



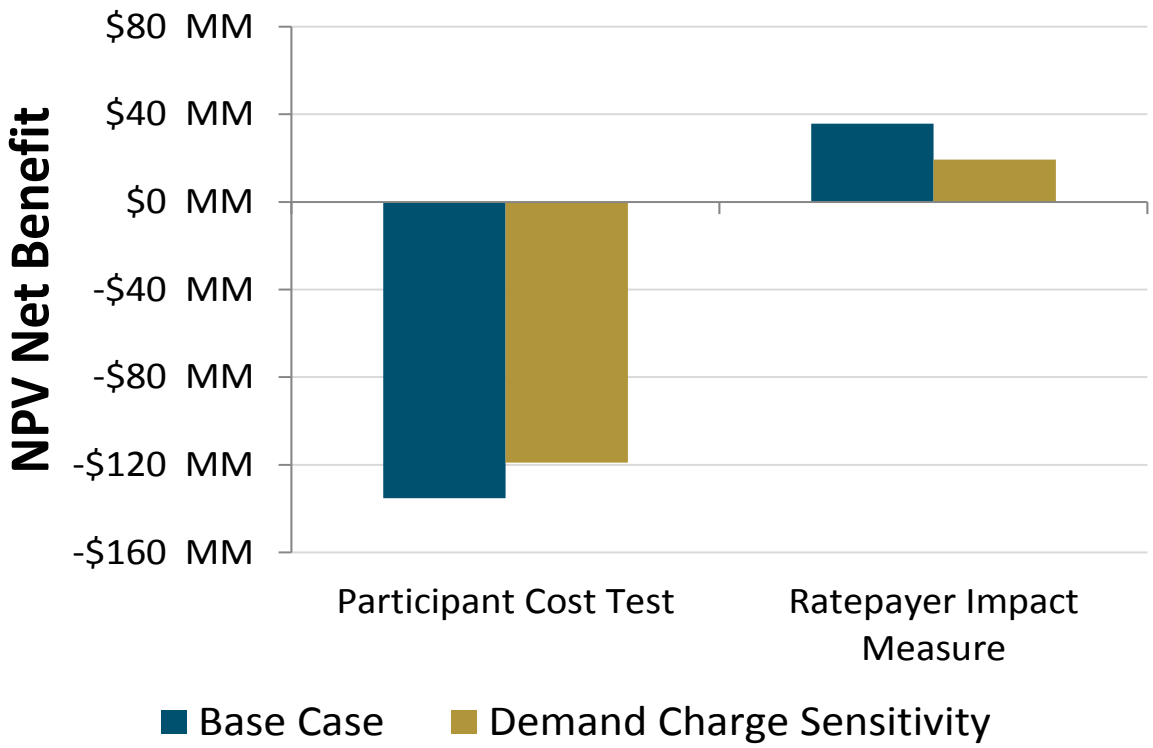
Rate Scenario Sensitivity



Rate Escalation Sensitivity



Demand Charge Sensitivity



Utility-Scale PPS Sensitivity