

RPS IN RESTRUCTURED STATES

NV Energy Choice Task Force
August 9, 2017

Key decisions to be made

- How to handle stranded assets?
 - Income approach – determining market value of the asset (New England)
 - Full recovery of generation and regulatory costs (Ohio)
 - What's the date of stranded cost calculation?
- Does the state join an RTO?
- How does an RPS come into play?
- How does the state encourage forward contracting?

RPS was instituted as a reaction to deregulation

Source: <https://www.electricchoice.com/rps-deregulated-energy-markets/>

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Restructuring either provided savings to consumers or had little visible impact

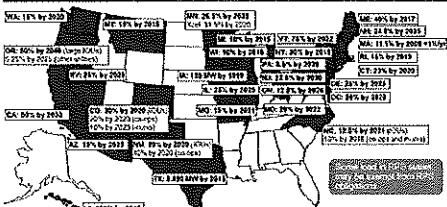
- Although rate increases were seen after restructuring, most of that increase was due to rising natural gas prices.
 - Massachusetts' retail customers saved \$1.7 billion during the first three years of restructuring.
- Connecticut's 2011 review of deregulation found that in 1998 (the year Connecticut passed its deregulation legislation) the unweighted average rate in the 14 deregulated states was 3¢ per kilowatt-hour (kwh) above the average in the other 35 states covered in this analysis. Since then, the difference has remained between 2¢ and 4¢ per kwh and was 3¢ per kwh for the first four months of 2011.

Source: <http://www.mass.gov/eia/ma-and-dissolved-states/deregulation/rpt13.pdf>
<https://www.ct.gov/edr/2011rpt/2011-R-0374.htm>

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RPS was often instituted alongside deregulation

RPS Policies Exist in 29 States and DC Apply to 55% of Total U.S. Retail Electricity Sales



Source: Berkeley Lab. LBNL's analysis is based on RPS adoption by state for any applicable renewables. In addition to the RPS policies shown on the map, many non-RPS energy policies exist in a number of U.S. states, and both voluntary RPS policies and non-binding goals exist across U.S. territories and American Samoa. Data: EIA's Annual Energy Outlook 2016.



More than half of U.S. electricity sales happen in a market with an RPS. LBNL reports. LBNL 2016 RPS update

Retail rates are unlikely to be impacted due to RPS

- Lawrence Berkeley National Labs recently published a review of RPS rate impacts. Some of its conclusions include:
 - Retail electricity rates have, on a national basis, been flat for roughly a decade
 - States endowed with high-quality wind and/or solar resources have, in some cases, likely witnessed rate decreases
 - State RPS policies have generally increased rates, but the estimated magnitude of historical and forecasted rate impacts span a wide range

Source: <https://emp.lbl.gov/sites/all/files/bel-1007281.pdf>; <http://www.mass.gov/eea/docs/doer/electric-deregulation/mm3.pdf>

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Having an open market doesn't guarantee clean energy in the state

- Although purchasers have the option to choose renewable energy, it's important to set up a system that makes that choice easy and accessible to all consumers.
- Potential option: The POLR should provide a standard offer of 100% clean energy?
- An RPS also guarantees clean energy production and provides a hedge against future federal environmental regulations and reduce future stranded assets.
- Nevada's cities and counties should consider aggregate purchasing for RE power (esp. those that used NV Energy's green tariff).



How to encourage developers to bring projects into Nevada in 5 years leading up

- Solar developers definitely want to be a part of the market
 - Permitting hurdles – BLM owns most of the land that would be best for solar production
- Provide a centralized purchasing authority to offer an option beyond a REC-purchase-only RPS to provide certainty
- A predictable increase in demand through greater adoption of PEVs and EVSE infrastructure



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Potential policy proposal for easing into restructuring

- Arizona explored restructuring in 2012 and approved a short-term test pilot.
- Nevada might consider a test pilot just for commercial and industrial class prior to the full 2023 move to deregulation. This pilot could be instituted via legislation after the 2018 ballot initiative.
- Moving from a cost-of-service ratemaking to a market-based ratemaking process could lead the PUC to open up new dockets to explore how to incorporate DER into the grid.



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Questions?

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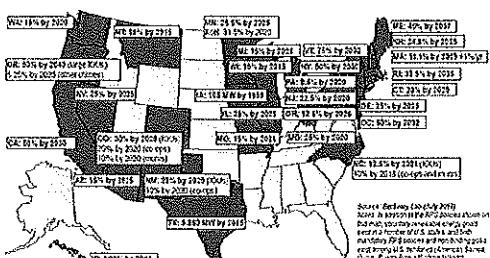
Renewable Standards:
Clean Energy Development & Other Impacts



Amanda Levin
August 9, 2017

Renewable Standards and Clean Energy Development

Status of Standards in U.S.



- 29 states and DC have binding renewable portfolio standards (RPS).
- These binding standards now cover 56% of all electricity sales in the U.S.
- Most RPS have been in place for over a decade, providing analysts and policymakers with robust data and evidence on the customer, economic, and environmental impacts of these policies.

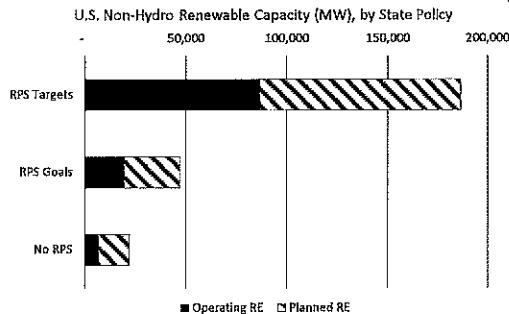
The Basics of RPS

1. A Renewable Portfolio Standard (RPS) is a regulation that requires electricity providers or utilities to generate a portion of electricity supply from renewable energy sources, such as wind, solar, biomass, and geothermal.
2. RPS policies and rules vary across states. State-specific elements include:
 - a. Target levels and timeframe;
 - b. Entities covered;
 - c. Eligible technologies, such as rules related to fuel source, size, operational date, location, and deliverability of the energy;
 - d. Use of tiers, carve-outs, or multipliers;
 - e. Contracting requirements and procurement planning;
 - f. Cost caps, alternative compliance payments

Standards have been a major driver of renewable energy development in U.S. in past

1. More than 50% of all non-hydro renewable power built since 2000 was to meet RPS requirements.
2. The U.S. has added an average of 6 GW of new renewable power annually to meet RPS needs over the past decade.
3. In 2016, renewable portfolio standards required utilities to procure an additional 146 TWh of renewable energy above 2000 levels.
 - a. This is enough to power 13.5 million U.S. homes for a whole year.

States with standards have seen the bulk of U.S. renewable energy development



The role of RPS has changed in recent years, in certain regions

1. Actual renewable growth has outpaced RPS needs in recent years.
 - a. This is due mainly to economic, non-RPS wind in the Midwest and Texas. However, in the West, actual RE growth has matched closely with RPS needs.
2. In the last year or two, there has been a significant shift in what resources are built to meet RPS demand.
 - a. While wind energy makes up more than half of all RPS capacity built since 2000, solar made up almost 80% of RPS builds in 2016.

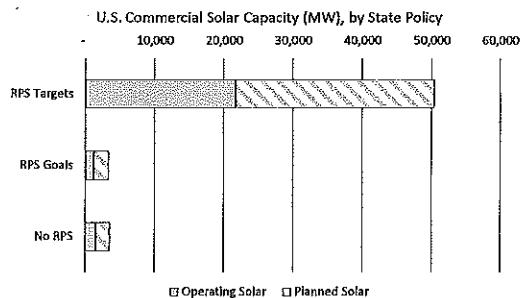
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Standards will be a driver of renewable growth in the future

1. Existing RPS requirements will still require roughly a 50% increase in U.S. RE generation by 2030.
 - a. This is about an additional 55 GW of new wind and solar capacity by 2030.
2. Estimated that Nevada will need to procure enough additional renewable energy to meet another 10% of state electricity sales in 2030.

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Solar builds are overwhelmingly located in states with renewable standards.



RPS-driven projects already support a large number of U.S. jobs and economic activity

1. Renewable projects built to meet RPS demand supported 200,000 U.S. jobs in 2013 and contributed around \$20 billion to the U.S. economy (GDP) that year.
2. The federal government estimates that meeting existing requirements will support around 134,000 U.S. jobs a year over.
 - a. Strengthening these standards nationwide could support over 325,000 U.S. jobs annually.

Rate impacts have been small, and even negative in certain states

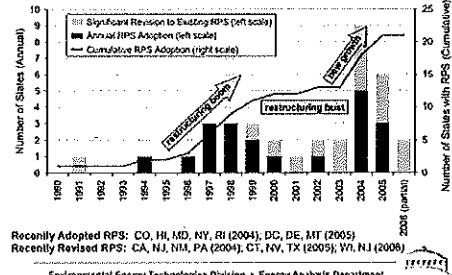
1. Studies of RPS impacts have found compliance costs are small, on average, and can be negative in certain cases
 - a. The national labs annually track the costs of RPS compliance. Compliance costs average 1.8% of consumer bills across states with binding targets in 2015.
2. Most studies expect rate impacts will be less than 1% in the final RPS target year (e.g. 2025, 2030). About five states have projected net reductions in rates by the target year.
3. Rate impacts are expected to remain low, even as RPS standards increase, due to falling renewable energy costs.
 - a. Wind and solar power purchase agreements (PPAs) are already as cheap or cheaper than the wholesale power prices in parts of the U.S., making these resources a least-cost option.

Standards have helped mitigate wholesale power prices and slow rate growth

1. Once built, renewable projects have minimal costs to run. By adding low-cost energy to the market, it reduces the need to rely on higher-cost resources.
2. Average electricity prices in RPS states have grown at a significantly slower pace than non-RPS states.
3. Renewable energy can also help reduce upward pressure on gas prices, which can result in significant heating cost savings for consumers (up 1.9 ¢/kWh-RE of gas savings)

How have Retail Choice and RPS interacted?

The history of RPS in U.S. is interconnected with history of retail choice



Customer choice will not, and was not intended to, by itself guarantee more clean energy or the resulting economic benefits.

Standards in restructured states

| | Established in context |
|-----|--|
| (C) | Established in tandem with restructuring (1998); applies to utilities and retail suppliers; 27% by 2020 |
| (D) | Established in 2005; applies to utilities and retail suppliers; 25% by 2025 |
| (I) | Established in "re-regulation" bill that created the Illinois Power Agency (IPA) which procures power for default service; 25% by 2025 for both utilities and retail suppliers |
| (M) | Established as part of restructuring legislation; 40% by 2017, applied to both utilities and retail suppliers |
| (M) | Established in 2005; 25% by 2020, applied to all utilities and retail suppliers |
| (M) | Established as part of restructuring legislation; 15% by 2020, with 1% each year thereafter, applied to both utilities and retail suppliers |
| (N) | Established in 2007; 24.8% by 2025, applied to both utilities and retail suppliers |
| (N) | Established in tandem with restructuring (1998); 20% by 2002 + 4% solar by 2027, applied to both utilities and retail suppliers |
| (N) | Established 2004; revised Dec. 2016 to 50% RE by 2030, applied to all utilities and retail suppliers |
| (O) | Established in 2008 as part of broad restructuring legislation; 12.5% by 2026, applied to both utilities and retail suppliers |
| (O) | Established in 2004; 18% alternative energy, applied to both utilities and retail suppliers |
| (R) | Established in 2004; 38.5% by 2035, applied to both utilities and retail suppliers |
| (T) | Established during restructuring transition (1999); 10 GW of RE capacity by 2025 (reached in 2009) |
| (T) | Established in 2005; 50% by 2032, applied to both utilities and retail suppliers |

A few common elements of RPS in restructured states

1. Most restructured states used RECs (Renewable Energy Credits) and Alternative Compliance Payments (ACP) to meet RPS requirements
 - a. RECs are the environmental value of renewable generation and can be bought and sold on a market. RECs do not need to be tied with consumption of the actual renewable generation
 - b. ACP is a set \$ per MWH penalty for any supplier who does not procure enough RECs. Serves as a backstop if competitive suppliers are coming up short.
2. Requirements cover both utilities and retail suppliers. Utility requirements tend to reflect default or standard-offer load.

Learning Curve: RPS Issues in Restructured States

1. The overwhelming reliance on short-term purchases of RECs created a few main issues:
 - a. Without long-term contracts, it can be difficult for developers to get financing for renewable projects.
 - b. In addition, the REC market can be volatile, resulting in large variations in RPS compliance costs across years.
 - c. Because RECs are not tied to deliverability of the energy, it can slow growth of renewable energy in the state or region where the REC is actually meeting RPS requirements.
 - d. Ensuring local energy development to maintain a diverse and reliable system can be a challenge in restructured states.
2. Some restructured states have also come across issues with the collection and use of alternative compliance payments.
 - a. Tended to be occur where the ACP was designed as the standard compliance method for retail suppliers, rather than a penalty mechanism.

How have standards been modified to address historic issues?

- Requirement to procure long-term contracts with renewable generators
- Geographic restrictions on RECs (such as deliverability requirements, usually set at regional grid level)
- Established rules around use of ACP funds (e.g. in-state community solar, rooftop solar deployment)
- Technology carve-outs (e.g. storage, offshore wind, solar, industrial CHP).
- Tiers that have in-state and/or operational date restrictions.

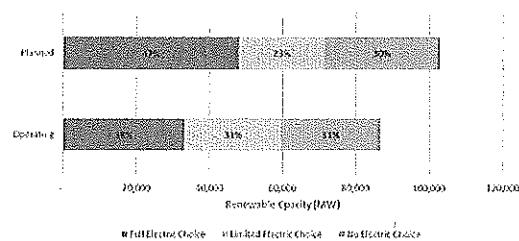
Recent structural modifications to RPS requirements in restructured states

Modification

- CT** Updated to require utilities enter long-term contracts (15 years) for RE facilities, both small-scale and large-scale. The state environmental agency (DEEP) can solicit proposal, select qualifying proposals, and require distribution companies to enter into long-term contracts. Geographic restrictions on eligible projects. Process upheld by appeals court in June 2017.
- NY** Revised to include a "new resource" tier and "maintenance" tier, with geographic restrictions. Long-term contracts done through central procurement process (NYSERDA); new order works to shift RPS obligations from distribution utilities to suppliers. NY structure seeks to promote customer choice and clean energy access for all consumers, with specific measures to support robust voluntary green markets, ESCO and DER markets, and community renewable projects.
- IL** Revised to include provisions that set explicit, long-term (15-yr) new build requirements that will ensure that renewable energy credits are supplied by new construction of wind and solar projects in the state, including community solar, low-income solar, brownfield solar, and distributed generation projects. The Illinois Power Agency (IPA) is now tasked with procuring RECs to meet all requirements. Future funding will come through fees on all customer bills and will be held by utilities to be used by IPA. Alternative Compliance Payments will now also be made directly to utilities.
- MA** State has passed complementary bills setting specific targets for energy storage, offshore wind, and solar. To be procured through long-term agreements by distribution utilities.

Retail choice states can have robust clean energy development

Renewable Capacity In RPS States by Regulatory Structure



Challenges of retail choice and the role of standards

1. Customer choice does not, by itself, guarantee more clean energy, full market access, or innovative customer options. Choice should not undermine state policy or economic development objectives, and can complement and enhance policy objectives when done right. Renewable standards can help serve two vital roles:
 1. **Ensuring customer protection:** an RPS can make sure all customers get a minimal amount of RE and help support the state's shift to clean energy without significant price impacts. Renewable funds and carve-outs can also serve to ensure all customer have access to clean energy opportunities.
 2. **Ensuring adequate investment in capital intensive infrastructure:** restructuring can impact many investments including: transmission, metering infrastructure, energy efficiency, generation, and reliability. The state must ensure minimum standards and adequate investment in all of these areas through new rules, robust oversight, and investment frameworks.

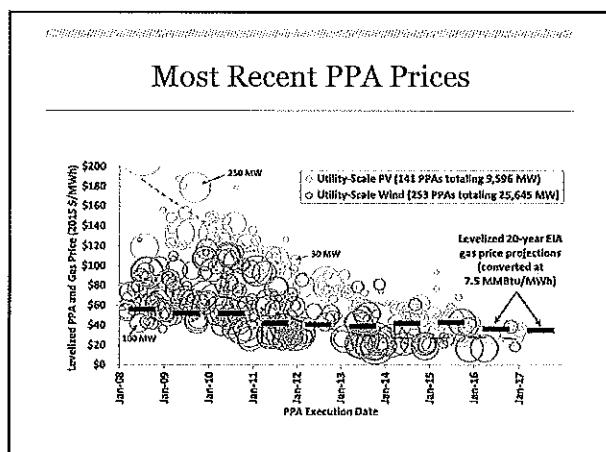
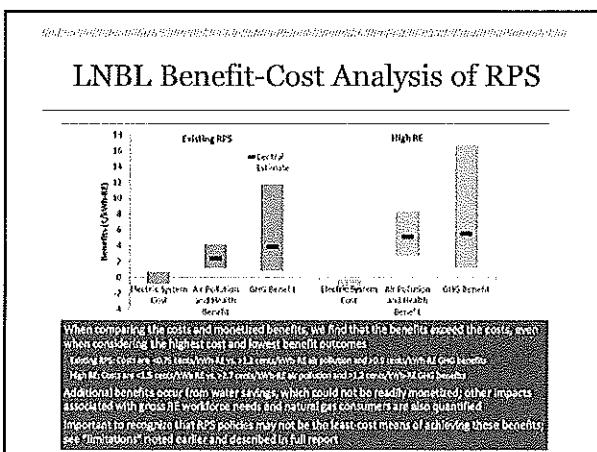
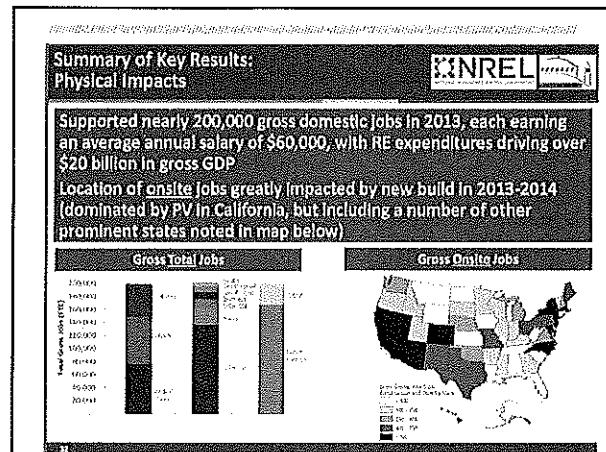
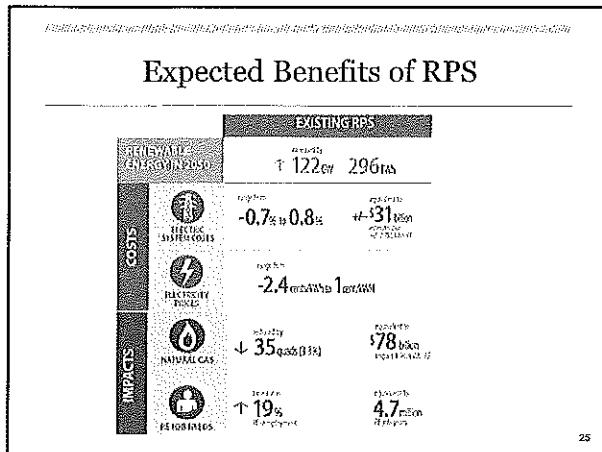
Other mechanisms to encourage clean energy under retail choice

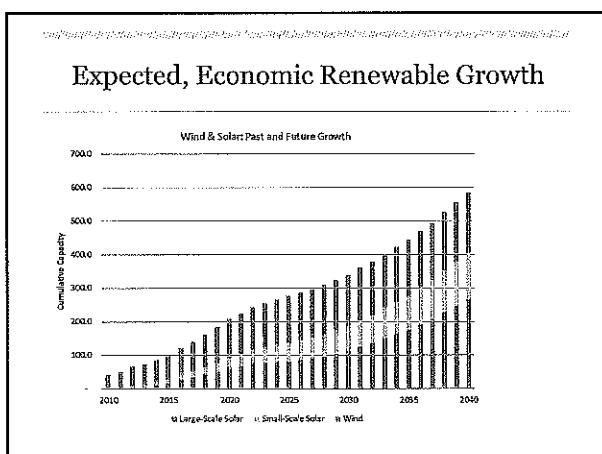
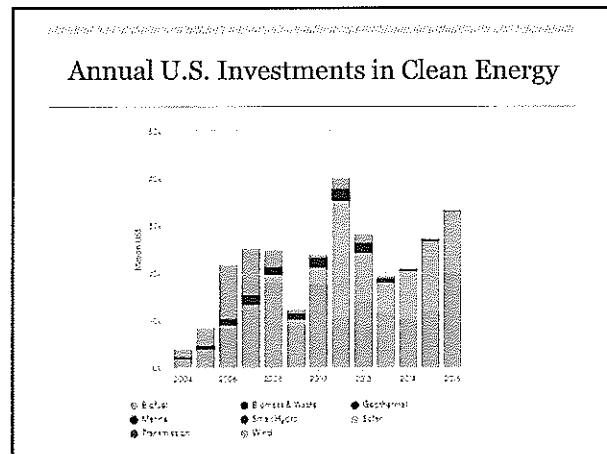
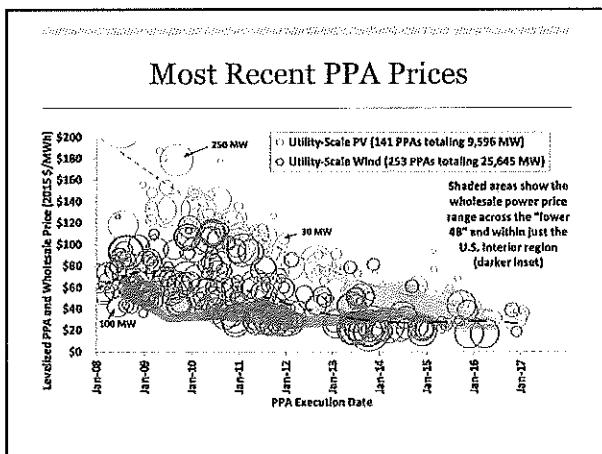
1. Some restructured states have required the default provider to offer innovative, regulated rate options for all customer classes.
 - a. This includes 100% renewable/green pricing plans and dynamic pricing options (e.g. time-of-use, real time pricing)
2. States are also exploring ways to incentivize customer-sided renewables and efficiency through market-based programs.
 - a. This includes rules and assistance for those interested in: solar leasing, community solar, demand response providers (e.g. ESCOs), etc.
 - b. Customer protection and data sharing protocols are also essential to ensure that all retail suppliers can provide customers with the full suite of services and rate options, while protecting customers in the marketplace.

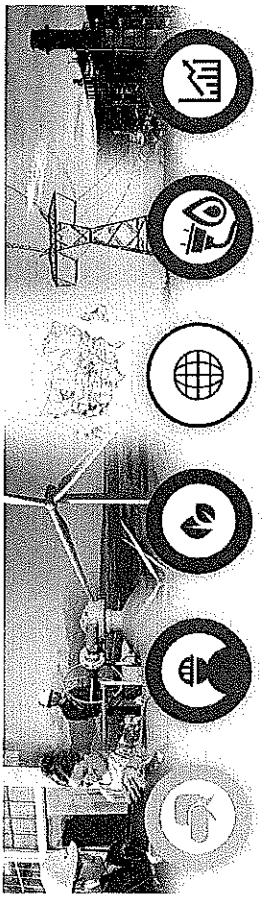
Thank you

APPENDIX SLIDES









NV Energy Energy Efficiency, Renewable Energy & Public Policy Customer Programs

Pat Egan

SVP, Renewables & Smart Infrastructure

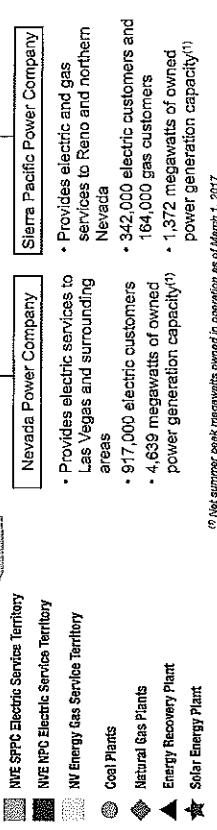
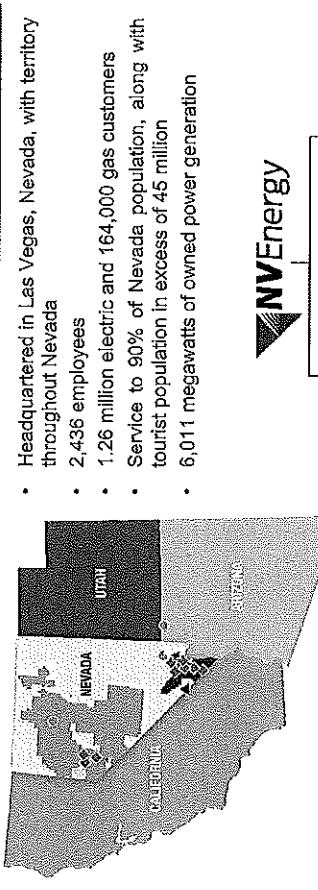
Governor's Committee on Energy Choice

Technical Working Group on Innovation, Technology, and Renewable Industries

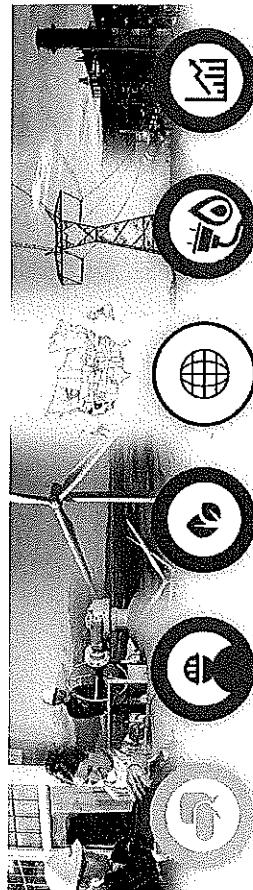
October 10, 2017



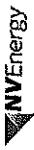
- NV Energy Customer Engagement
- Energy Efficiency and Usage Management
- Incentives and Policy Programs
 - Renewable Generations Program
 - Electric Vehicles
 - Policy Direction
 - Distributed Energy Resources
- NV GreenEnergy Rider and Renewable Portfolio Standard



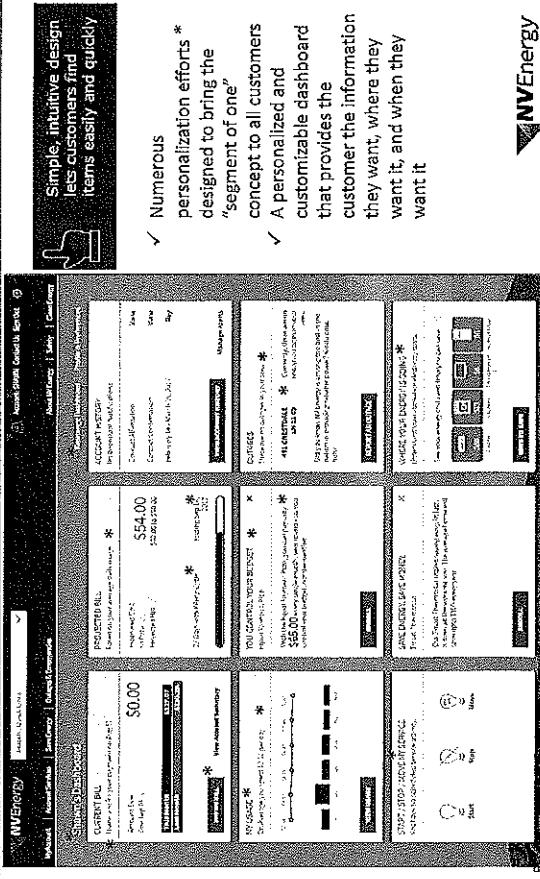
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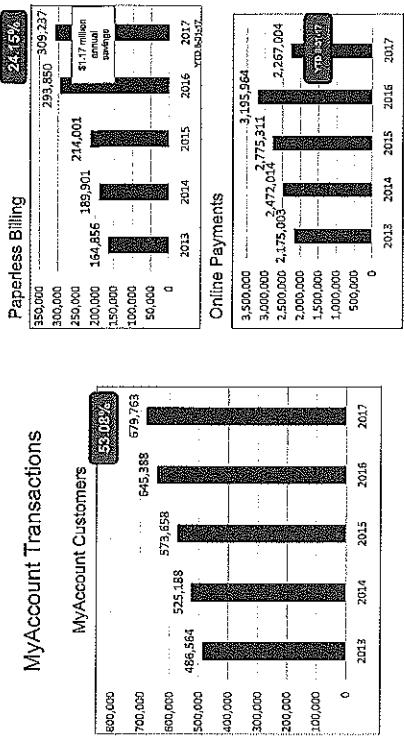
Customer Services



APPLIED EXERCISE SCIENCE



Electrokinetic Treatment Trends



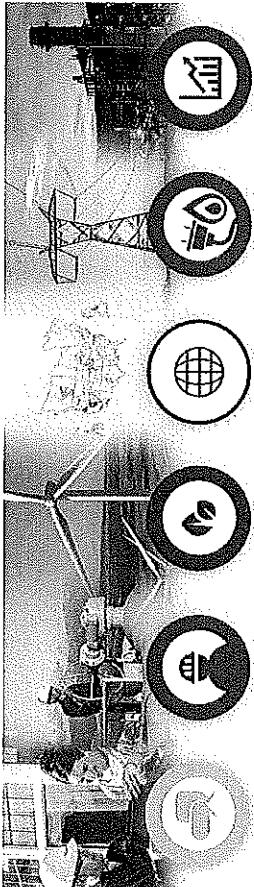
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NV Energy Demand Side Management Services to Nevada Customers

- Advanced assessments and incentives for commercial new construction or retrofit projects
 - Non-profit agency grants
 - Public school and higher education energy efficiency and demand response projects
 - Early replacement or air conditioning retrofits units
 - HVAC tune ups
 - Smart Thermostats
 - Legacy Coolshare and two-way switches
 - Energy efficiency and demand response controls through smart thermostats, demand limiting devices and universal gateways
 - Online and home energy assessments to aid customers in identifying energy saving opportunities including direct install measures [LEDs, photo sensors, air filters and coil wraps]
 - Home and business reports providing energy information about usage along with energy saving advice
 - Activities that provide energy information through participation in community events

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Demand Side Management
Energy Efficiency Services
Demand Response



1

Commercial

- | | |
|-----------------------------|--|
| Schools | <ul style="list-style-type: none"> • Public school and higher education energy efficiency and demand response projects |
| Residential AC | <ul style="list-style-type: none"> • Early replacement or air conditioning retrofit units • HVAC tune ups |
| Residential Demand Response | <ul style="list-style-type: none"> • Smart Thermostats • Legacy CoilShares and two-way switches |
| Commercial Demand Response | <ul style="list-style-type: none"> • Energy efficiency and demand response controls through smart thermostats, demand limiting devices, and universal gateway coils (wraps) |
| Energy Assessments | <ul style="list-style-type: none"> • Online and home energy assessments to aid customers in identifying energy saving opportunities including direct install measures (LEDs, photo sensors, air filters and coil wraps) |
| Energy Reports | <ul style="list-style-type: none"> • Home and business reports providing energy information about usage along with energy saving advice |
| Other | <ul style="list-style-type: none"> • Much like other providers, energy information through merchandising is common in this category. |

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ANEV

- Advanced assessments and incentives for commercial new construction or retrofit projects

- Public school and higher education energy efficiency and demand response projects

- Early replacement of air conditioning retrofit units
- HVAC fine line

- Smart Thermostats
- Energy Consoles and Much More

- Energy efficiency and demand response controls through smart thermostats, demand limiting devices and universal meterbase

- Online and home energy assessments to aid customers in identifying energy saving opportunities including direct install measures (LEDs, photo sensors, air filters and

- Home and business reports providing energy information about usage along with energy savings advice.

- Activities that provide energy information through participation in community events

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NVEnergy

Customer Engagement

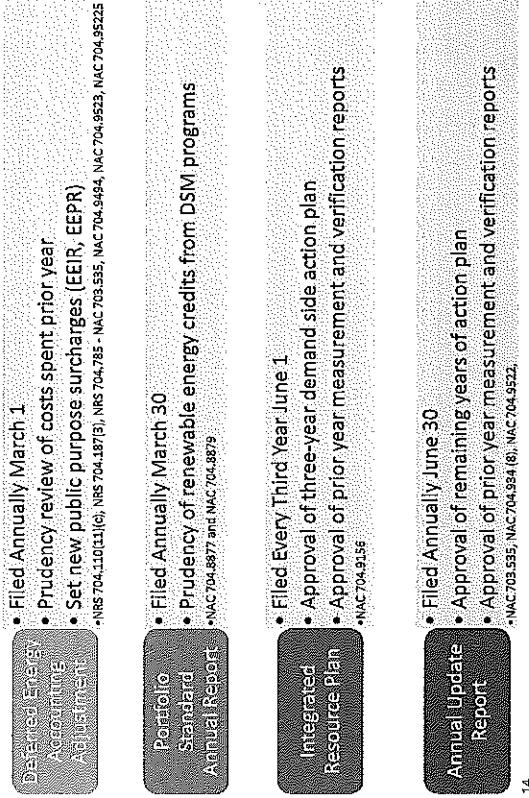
The Right Tools to Save You Energy and Money



- **Awareness**—Strategies include a combination of media (earned, paid, social), direct response customer outreach, and web/mobile/email offerings
- **Recruitment**—Strategies include utilizing pathways through existing customer contact, onboarding support of new customers, referral opportunities and energy education and outreach local community events
- **Retention**—Strategies include utilizing regular communications for continuous engagement and feedback to the Company



DSM Approval Process



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Historic Budgets, Portfolio Programs, Energy and Demand Savings



| NV Energy | 2012 | 2013 | 2014 | 2015 | 2016 |
|--|----------|----------|----------|----------|----------|
| Energy Savings (MWh) | 182,472 | 177,199 | 231,199 | 245,903 | 225,601 |
| Energy Efficiency Programs Peak Reduction (MW) | 30 | 27 | 36 | 35 | 33 |
| Demand Response Peak Reduction (MW) | 154.1 | 178.9 | 192.3 | 214.8 | 228.4 |
| Expenditures (\$'000) | \$38,669 | \$39,391 | \$48,875 | \$45,505 | \$48,911 |
| DSM Energy Savings as % of Sales | 0.62% | 0.60% | 0.79% | 0.82% | 0.75% |

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DSM Funding Example



| An average residential customer pays approximately \$16.00 per year to fund Demand Side Management programs | | | | | | |
|---|--|--|--|--|--|--|
| That same customer can reduce their energy use by installing a single smart thermostat in their home and decrease their bill by approximately \$56.00 per year at Nevada Power and \$20.00 per year at Sierra | | | | | | |
| By installing a single smart thermostat a NV Energy customer not only recoups the cost to pay for DSM programs but also continues to save additional dollars on his/her bill | | | | | | |

| Company | Energy Efficiency Charge | Average Monthly Usage Residential | Monthly Energy Efficiency Cost | Annual Energy Savings to Break Even (KWh) | Standard Electric Rate | Annual Electric Savings for one Residential Thermostat (KWh) | Annual Standard Electric Rate Savings |
|---------|--------------------------|-----------------------------------|--------------------------------|---|------------------------|--|---------------------------------------|
| NPC | \$ 0.00148 | 1,110 | \$ 1.31 | \$ 15,72 | \$ 0.1154 | 140.91 | \$56.22 |
| SFCO | \$ 0.00161 | 743 | \$ 1.34 | \$ 16.14 | \$ 0.0822 | 162.93 | \$20.29 |

- The PowerShift by NV Energy smart thermostat program continues to save the customer energy money throughout the life of the thermostat, which is currently 10 years



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Customer Engagement in DSM

- PowerShift by NV Energy products and services helps customers conserve energy, lower their energy costs and reduce emissions



In 2016, PowerShift customers saved nearly 225,000 megawatt-hours of electricity, enough to power more than 110,000 homes

In 2016, PowerShift provided services to over 159,000 residential customers and 2,357 commercial customers; over 3,000 of these residential customers received in-home energy assessments

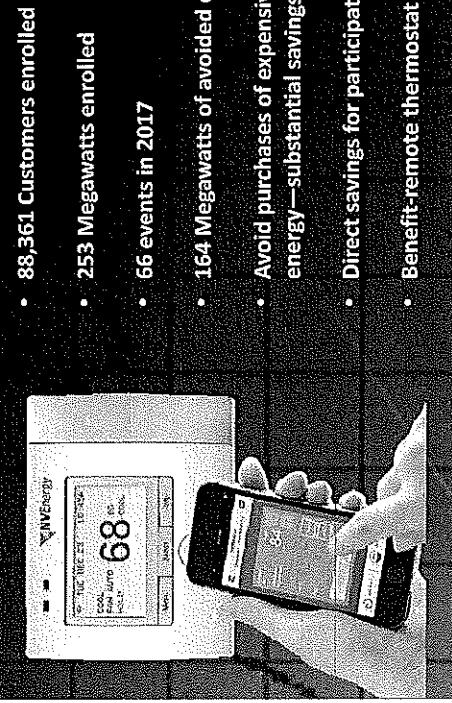
In 2016, PowerShift provided energy education to over 80,000 residential, commercial, and building industry support customers

In 2017 to date, PowerShift customers included 256,708 residential customer participants, 2,478 commercial customer participants; over 5,000 of these residential customers received in-home energy assessments and energy education has been provided to over 65,000 customers

For the past ten years the average annual energy savings is 0.94% of total sales, and the cumulative annual energy savings for the past ten years is 2,745 gigawatt-hours



Demand-Side Response One Example

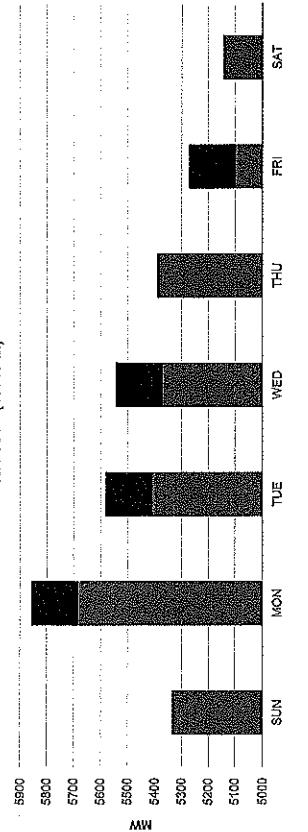


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Southern Nevada Demand Response June 19 - 25, 2016



South MW Load With DR Events HE 1800 (6:00PM)



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2017 Nevada Legislation



- AB 223 – Transition from stand-alone program approval to portfolio approval; allocation of 5% of DSM budget to low income customers
 - NV Energy will need to adjust or modify how it evaluates energy efficiency programs based on a set of programs as opposed to individual programs.
 - This change will now allow programs that historically were not cost effective individually to now be incorporated, thus expanding the types of energy efficiency programs that can be offered.
 - NV Energy will now need to allocate at least 5% of its DSM budget to low income customers.
- SB 150 – Commission establishes energy efficiency targets and cost effectiveness tests
 - The Commission is required to establish by regulation goals for energy efficiency to be included in the company's integrated resource plan.
 - NV Energy required to submit in its' integrated resource plan an energy efficiency plan that meets the goals established by the Commission.
 - NV Energy agreed to conduct a study to evaluate all potential energy efficiency programs by end of 2018.



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Renewable Generations Programs

- Incentive program created by Legislature in 2003 (NRS 701B) to assist customers with installing private solar, wind, and hydro systems.
 - 2013 Legislature set a spending limit of \$255.2 million for 250,000 kW¹ of solar and \$40 million² for wind and hydro combined (no capacity goal).
 - 2017 Legislature combined spending limits into one pool of funding, expanded eligible technologies into electric vehicle infrastructure and energy storage.
 - 20,438 customers have taken advantage of program.
 - Solar is the only program currently receiving active applications from interested customers.
 - 78% of all customers taking service under net metering provisions have done so through these programs. Since 2015, the percentage has increased to 85% of all customers.

RenewableGenerations Programs

| Applied Toward Legislative Goals | | | | | |
|----------------------------------|-------------------------|----------------|-------------------------|----------|---------------|
| | Since Program Inception | Spend (\$ mil) | Capacity Installed (kW) | Capacity | Spend |
| Program Metrics ³ | Capacity Installed (kW) | | | | |
| | 176,607 | \$230,105,540 | | 172,817 | \$212,839,918 |
| | 10,360 | \$26,246,208 | | 9,735 | \$26,163,708 |
| Wind | Wind | 595 | \$1,447,500 | 595 | \$1,447,500 |
| | Solar | 187,552 | \$257,799,248 | 183,147 | \$240,451,126 |
| | Total | | | | |

1. Applies to systems installed on or after July 1, 2010
2. Applies to systems installed after July 1, 2009
22. 3. As of August 31, 2011. Does not include numbers on systems with arrival recommendations

How Do the Programs Work?

- Program funding is provided by NV Energy's customers through the Renewable Energy Program Rates paid on their monthly bill. The rate is paid on a volume consumption basis.
 - The programs are open on a continuous basis until funding is exhausted.
 - Plans are proposed annually to the PUCN, reviewed by interested stakeholders, and approved by the Commission.

Systems with a total capacity of up to 500 kW are eligible.

Incentives are paid up front at the completion of construction for small systems, or over time for larger systems based on actual performance.

The renewable energy credits generated by program incentivized systems are assigned to the utility to apply toward the renewable portfolio standard (11.3% of all renewable credits applied by the utility for compliance in 2016).

Steps to complete a Solar System

1. Partner with an installer to complete a design
 2. Submit an application online, receive reservation
 3. Construct system
 4. Submit completion package
 5. Interconnect system
 6. Begin receiving incentive payments

1. As of August 31, 2017. Does not include expected future payments for performance based incentives

Solar Generations Total Spending By Category

- Since the program's inception, spending has been tracked by sector
 - Schools and Public Institutions received a majority of funding, and the highest average incentive for capacity installed
 - Residential customers have generated the largest number of projects

| Sector | Total Incentives Paid | Capacity Installed (MW) | Completed Projects | Average incentive (\$/kW/d) |
|-------------------------------------|-----------------------|-------------------------|--------------------|-----------------------------|
| Residential/ Small Commercial | \$41,652,319 | 118,536 | 19,573 | \$0.32 |
| Large Commercial/ Industrial | \$533,784 | 9,888 | 28 | \$0.09 |
| Low Income/ Non Profit | \$4,326,902 | 2,228 | 52 | \$1.94 |
| Schools | \$110,129,889 | 27,067 | 304 | \$4.07 |
| Public Entity / Public and Other | \$73,052,656 | 18,879 | 360 | \$3.87 |
| Total | \$230,405,546 | 176,507 | 20,267 | \$1.30 |

How Do the Programs Work?

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Current Solar Incentive Levels (Beginning 7/1/2017)

| | |
|------------------------|----------------|
| Incentives— | |
| Residential/Commercial | |
| Less than 25 kW | \$0.245 / Watt |
| 25 kW to 500 kW | \$0.0284 / kWh |
| Less than 25 kW | \$0.49 / Watt |
| 25 kW to 500 kW | \$0.0527 / kWh |

1. As of August 31, 2017. Does not include expected future payments for performance based incentives

Lower Income Solar Energy Pilot Program (LISEPP)

- Created by the 2013 Legislature to build 2,000 kW of solar capacity to benefit low income customers, paid for 100% from the SolarGenerations program.
- Recipients are required to utilize bill savings towards programs serving low income populations.

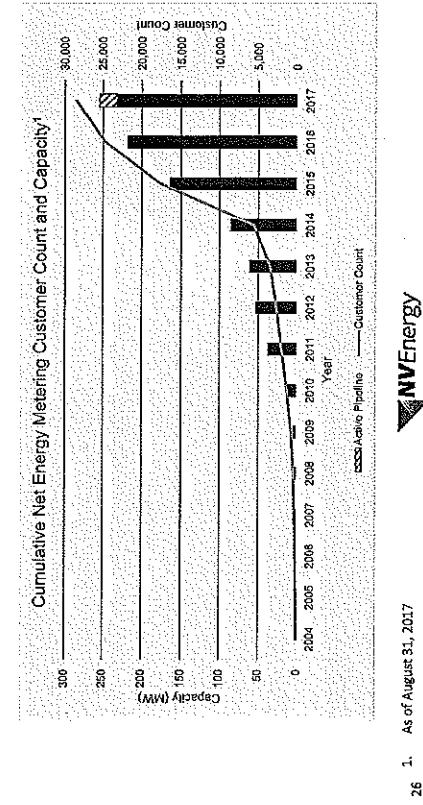
PHASE I: 1,000 kW, \$3.0 million

- Installed at 8 Title I schools throughout the state.
- Completed in Spring of 2016.
 - Utility bill savings must flow directly to benefit student populations at host school.
- PHASE II: 1,000 kW, \$4.1 million
 - Installed at 15 non-profit facilities statewide.
 - Completed spring of 2017.
 - Utility bill savings must flow directly to benefit the low income and disadvantaged populations they serve.
 - Partnered with Governor's Office of Energy who provided \$350k toward project.



NV Energy Historical Net Metering Information

- 26,273 net metering systems interconnected for 231.4 MW.
- Additional 2,210 systems are currently in the pipeline for 23.1 MW.
- NVE handles the netting function and purchases excess energy.



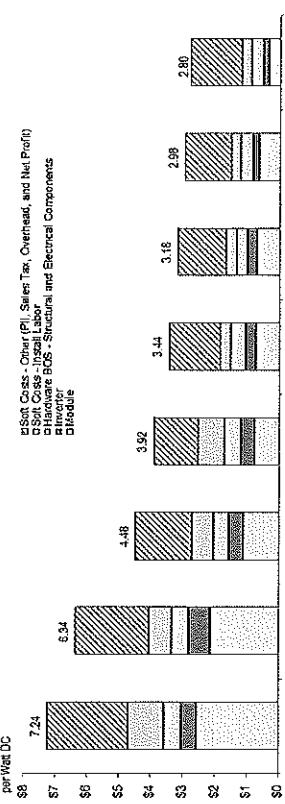
1. As of August 31, 2017



Residential Private Solar Installation Costs

- Average residential solar installation costs have declined by 61% since the beginning of this decade.
- From 2016 to 2017, costs declined 6%, driven primarily by module cost declines, offset partially by increases in ancillary soft costs.

NREL residential PV system cost benchmark summary Q4 2009-Q1 2017



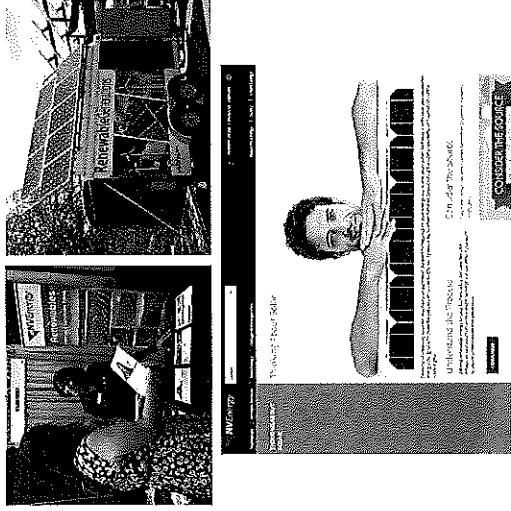
Source: Fu, Yan, et al.; U.S. Solar Photovoltaic System Cost Benchmark: Q3 2017; Technical Report NREL/TP-6A20-68925; National Renewable Energy Laboratory; U.S. Department of Energy; September 2017; Pg. 23.

Assembly Bill 405 Changes to Net Metering

- Requires that net metering customers are in the same rate class as similarly situated non-net metering customers.
- Creates four tranches of capacity (for systems 25 kW or less).
 - Tranche 1 – 80 MW priced at 95% of price of electricity.
 - Tranche 2 – 80 MW priced at 88% of price of electricity.
 - Tranche 3 – 80 MW priced at 81% of price of electricity.
 - Tranche 4 – uncapped priced at 75% of price of electricity.
- On September 1, 2017, the Public Utilities Commission of Nevada issued an order implementing Assembly Bill 405.
 - Excluded public policy costs (energy efficiency, low income assistance, renewable energy) from excess energy compensation.
 - Established a queue based on application submitted date to ensure that that 80 MW is installed in each tranche (no more and no less).
 - Created a regulatory asset to track and recover costs associated with implementing AB 405.
 - Implements monthly netting of electricity before determining excess energy compensation.

Net Metering Customer Outreach

- Outreach has been an important part of the SolarGenerations program since the inception of the program.
- NV Energy's website contains useful information on net metering billing, tips for customers looking to go solar, and explanations of the interconnection process.
- NV Energy regularly attends community events and has a demonstration trailer to educate customers on technology.
- NV Energy provides presentations to customer groups, including trade groups, homeowners associations, and community organizations.

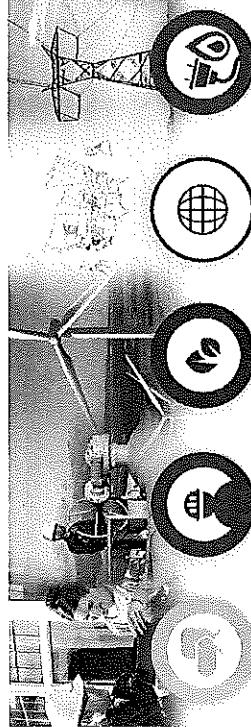


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Senate Bill 145 Enhancements to Program

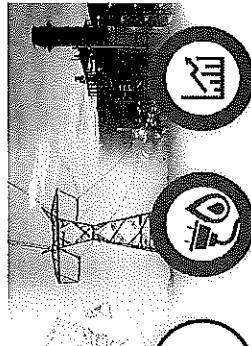
- Combined individual funding limits into one combined pool of \$295.2 million.
- Remaining funding of \$54.8 million¹ can be applied toward solar, wind, water, electric vehicle infrastructure, or storage projects.
- \$10 million explicitly allocated through the bill toward energy storage.
- Provides for a successor program to LSEPP, allocating up to \$1 million per year specifically for low income projects.
- At current incentive levels, funding is adequate to achieve solar 250 MW capacity goal, spend entire allocation toward energy storage, and allow significant investment in electric vehicle infrastructure.
- Retains sunset provisions of NRS 701B to conclude any new projects by December 31, 2021.

30 1. As of August 31, 2017. Excludes projects with active reservations that have not yet interconnected.



NV Energy Vehicle Electrification

NV Energy



Electric Vehicles Good For Nevada... Good For Customers

NV Energy

Electric Vehicles

Good For Nevada... Good For Customers

"NV Energy has demonstrated strong leadership and foresight in supporting electric vehicles."

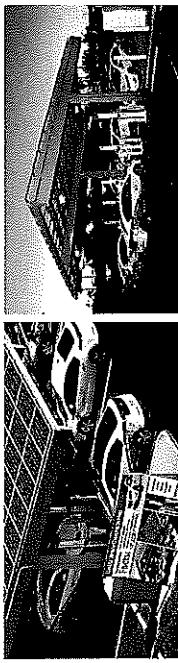
SOUTHWEST ENERGY
EFFICIENCY PROJECT (SWEET)

NV Energy Electric Vehicle Program

- Electric Vehicle Time of Use Rates since 2009
- Residential, Commercial, Multi-Family
- NV Energy Workplace & Public Charging
- Electrification of the NV Energy Fleet
- Charging Station Shared Investment Program
- Nevada Electric Highway Partnership

"This Electric Highway will allow electric vehicle drivers to power their cars by tapping into Nevada's own renewable energy resources. This will strengthen our state's energy independence while reducing Nevada's petroleum imports."

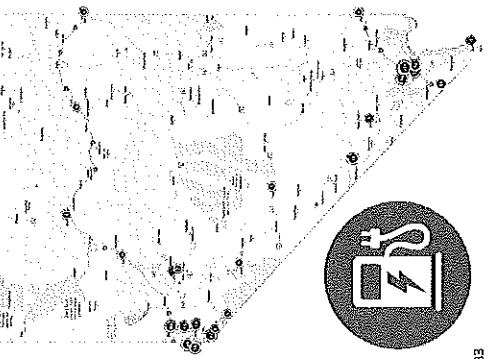
- Brian Sandoval, Nevada Governor



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NV Energy Charging Station Shared Investment Program

Partnerships Driving Sustainability



NV Energy partnered with ~50 Nevada companies in 2013 and doubled the electric vehicle charging infrastructure in Nevada

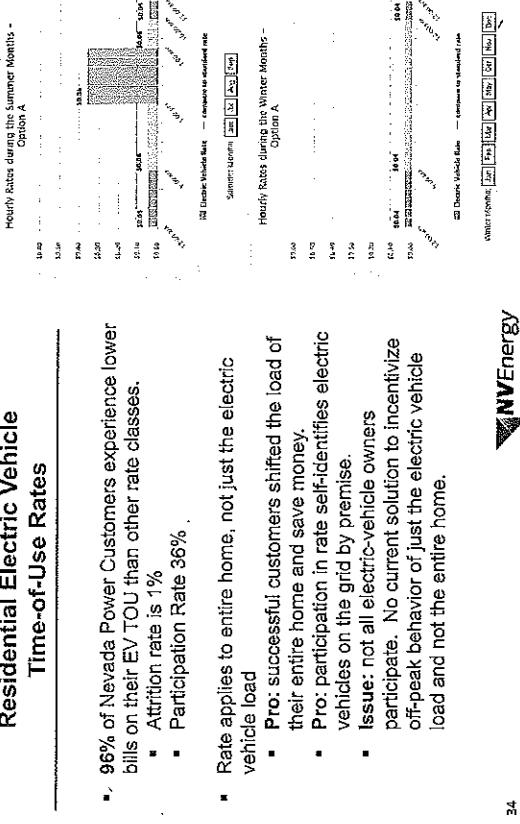
- ✓ Airports ✓ Casinos
- ✓ Universities ✓ Government Buildings
- ✓ Shopping Centers ✓ Small Businesses

"NV Energy's innovative and proactive market approach lets it keep pace with Nevada's quickly evolving electric transportation landscape, which Clean Energy Project believes will be central to our state's economic future and the new Nevada."

— Clean Energy Project



Residential Electric Vehicle Time-of-Use Rates



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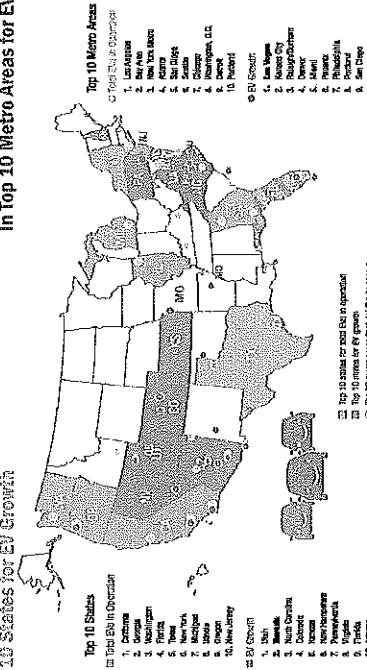
Shifting Electric Vehicle Load via Price Signals

Automotive Industry Megatrends. Electrified Happening in Nevada

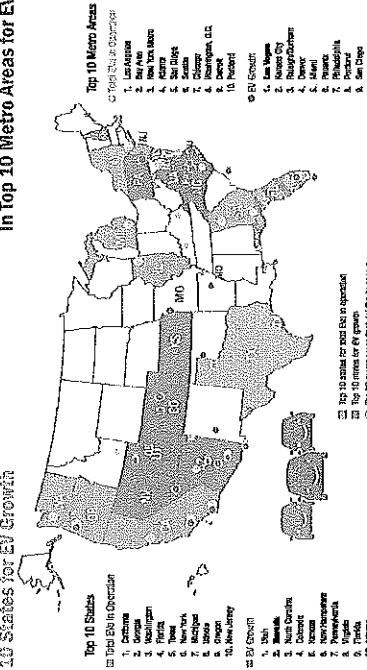
Nevada is Primed for Electric Vehicle Growth

With the implementation of the Electric Vehicle Infrastructure Demonstration Program, as part of Senate Bill 145, the Company is poised to support and accelerate the realization of electric vehicle growth in Nevada.

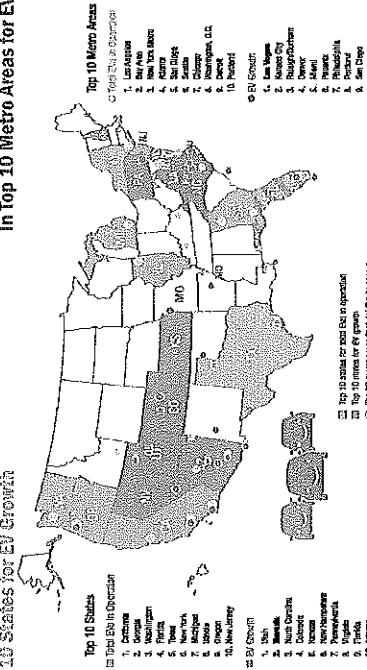
Las Vegas listed #1 In Top 10 Metro Areas for EV Growth



In Top 10 States for EV Growth



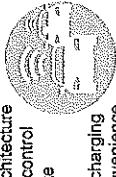
In Top 10 States



Source : ChargePoint

Autonomous

- EV vehicle architecture has a central control unit to facilitate autonomy
- Autonomous charging could add convenience



Automotive industry megatrends

- Greater annual driving distances can offer a decisive TCO edge for EVs
- Some consumers may prefer access to multiple vehicle types over ownership (including EVs)



Connected

- A connected EV ecosystem could increase the convenience of charging
- Connected car grid solutions could enable cost-effective load balancing



- Electrified
- Tightening emissions efficiency rules make EVs necessary to meet standards
- Lower battery costs improve EV economics



SOURCE: McKinsey Sustainable Mobility Initiative

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Residential Electric Vehicle Time-of-Use Rates

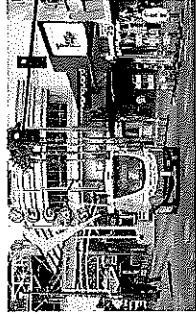


Source : ChargePoint

36

Innovation in Transportation Already in Motion: Autonomous, Connected & Electric (“ACE”) Initiatives

Las Vegas launches 1st electric autonomous shuttle on U.S. public roads

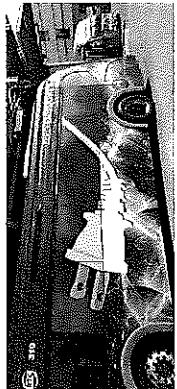


Sources: nevadavision.com
Las Vegas is a top 10 market for autonomous vehicle roll-out



37

Proterra Starts Industry's First Autonomous Bus Program in Nevada



RTC of Washoe County : 4th Street
Station, Reno



Sources: nevadavision.com

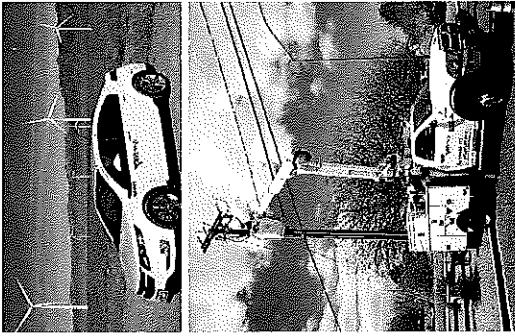
Fleet Electrification

- As Nevada embarks on transforming the transportation sector, the Company is in a strategic position to provide technical advisory services and charging infrastructure programs to accelerate fleet electrification and thus the environmental and economic goals of the State in an expeditious manner.

Green Fleet Sustainability All Stars*

- NV Energy has been expanding its hybrid fleet since the first hybrid bucket trucks were available in 2009 and is growing every year.
- Today, 11% of our fleet has electrification technology.
 - 45 hybrid bucket and line trucks
 - 41 hybrid ePTO bucket or line trucks
 - 18 passenger vehicles including the arrival this year of plug-in hybrid pick-up trucks

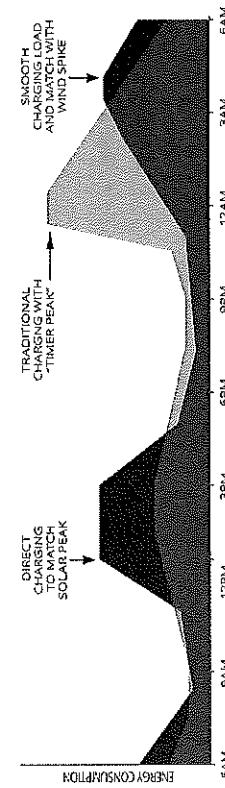
* Green Fleet Magazine
38



NV Energy

Electric Vehicles as Distributed Energy Resources

If utilities anticipate the load of charging EVs and plan for it proactively, they can not only accommodate the load at low cost, but also reap numerous benefits to the entire system.*



Source: BMW of North America, 2016 with data from Smart Electric Power Alliance 2017

- NV Energy has been proactive in our electric vehicle program to acknowledge that electric vehicle load may occur at peak and have thus designed levers and incentives in our programs to grow electric vehicle load off-peak wherever possible.
 - Electric vehicle time of use rates for residential, commercial, and multi-family customers.
 - Demand response clause to shed load if necessary for all electric vehicle charging stations encompassed in the NV Energy Charging Station Shared Investment Program.

*Rocky Mountain Institute Electricity Innovation Lab;
38 Electric Vehicles as Distributed Energy Resources

NV Energy

NV GreenEnergy Rider Policy and Background

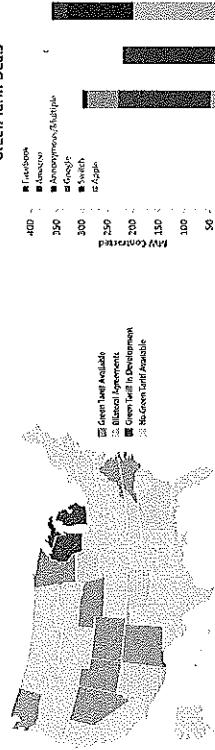
- Nevada Revised Statute 704:738 – Program of optional pricing for electricity generated from renewable energy: Authorization of Public Utilities Commission of Nevada (“PUCN”) required; Commission may authorize higher rates.
- Schedule No. NGR tariff , approved by the PUCN, also details applicability, rates, terms, and special conditions.
- The NV GreenEnergy Rider (“NGR”) program provides a means for customers to have all or some portion of load supported by renewable energy generation.
- Through the NGR, NV Energy and the customer may enter into a special contract (i.e., Renewable Energy Agreement, “REA”) under which the customer agrees to assume all of the costs of the renewable energy resource up to a specified amount, not to exceed the customer’s total energy consumption.
- The PUCN approves such a special contract upon, a satisfactory showing that NV Energy’s other customers do not subsidize the NGR transaction.



41

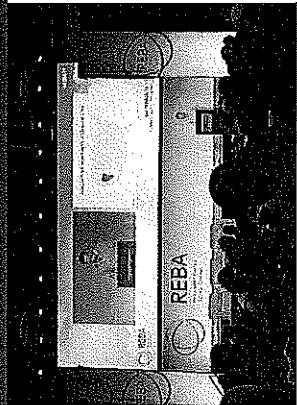
Existing NV GreenEnergy Rider Transactions

- Attractive, low-cost option for customers beyond the RPS
- Provides opportunity to improve equipment and installation costs for new solar
- The cost for the renewable attribute is among the best nationally, and customers are able to identify the source
- Customers pay the otherwise-applicable rate for energy
- NV Energy receives the energy and credits customers with the renewable attributes
- Nevada currently has nearly 50% of the commercial “green tariff” total capacity nationwide
- Among the announced green tariff transactions (900 MW total), 448.5 MW have been in Nevada.



42 Source: Heeter J., Charting the Emergence of Corporate Procurement of Utility-Scale PV, September 2017, NREL/PR-6A20-70003

Green Tariff Transactions Status



Renewable Portfolio Standard Policy and Background

- Renewable Portfolio Standard (RPS) - Energy policy that promotes the use of clean energy to meet the retail energy needs of the consumers in the state.
- Renewable energy credit (REC) = 1 kWh
- Credits are generated from utility scale solar, geothermal, wind, biomass, small hydro projects, and private generation
- RPS began in the late 1980's when the Public Utilities Commission of Nevada (PUCN) required Sierra Pacific to procure 85 MW of renewables – namely geothermal

- Energy efficiency is being phased out as a tool to meet the RPS
 - Put in place as a trade-off to increase the RPS
 - Currently 20% of energy efficiency is permitted
 - Decreasing to 10% effective 2020
 - By 2025 energy efficiency will no longer be used in calculations

Source: Heeter J., Charting the Emergence of Corporate Procurement of Utility-Scale PV, September 2017, NREL/PR-6A20-70003

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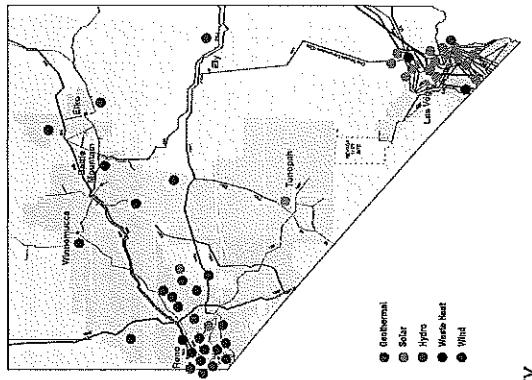


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NV Energy Renewable Energy Projects

- NV Energy customers benefit from a very diverse set of renewable energy resources:

- 19 Geothermal projects
- 15 solar projects
- 5 biomass/methane/waste heat
- 5 small hydro
- 1 wind farm

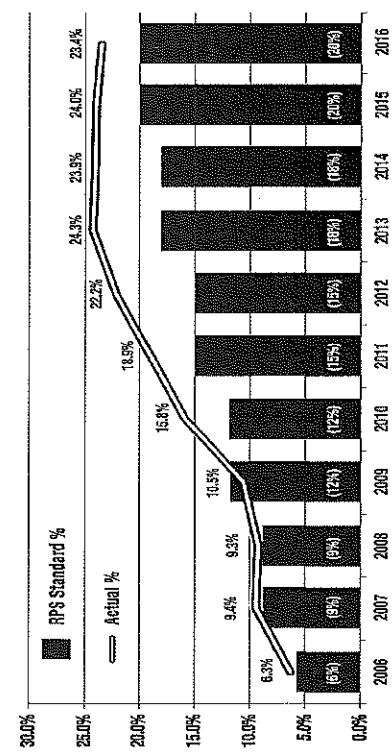


NVEnergy

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NV Energy RPS Compliance

NV ENERGY RENEWABLE PORTFOLIO STANDARD COMPLIANCE

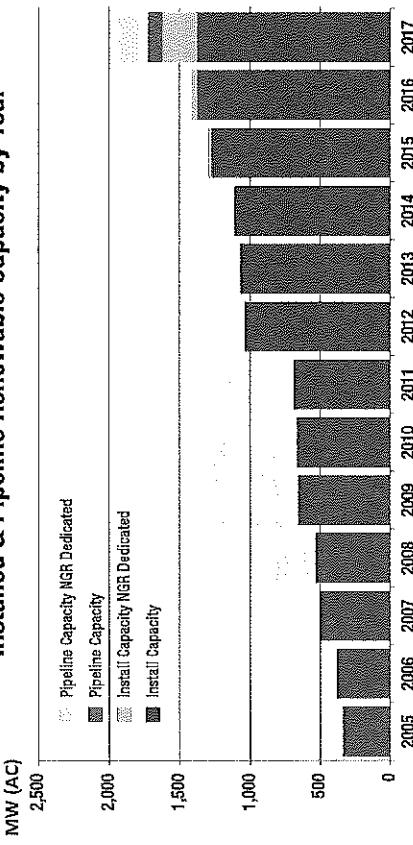


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NV Energy Renewable Energy Capacity Growing Steadily

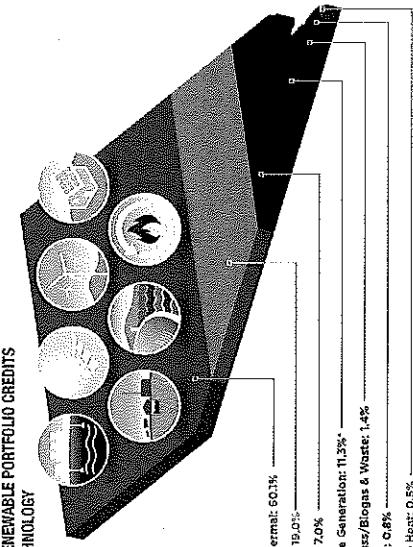
NV Energy Customers Benefit from a Diverse Renewable Energy Portfolio

Installed & Pipeline Renewable Capacity by Year



47

2016 RENEWABLE PORTFOLIO CREDITS BY TECHNOLOGY



*Private Generation includes solar, wind, and hydro systems installed at 4 customer locations.

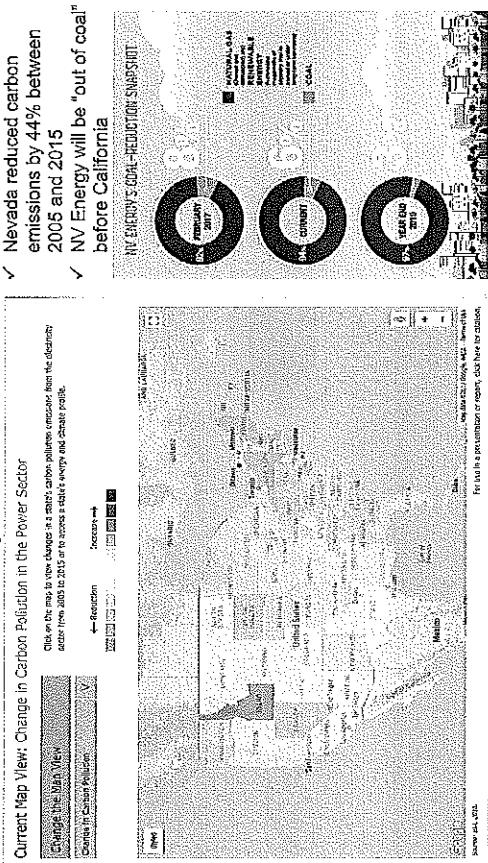
NVEnergy



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Nevada Carbon Reduction

- ❑ NV Energy is a leader in carbon reduction, collaborating with policymakers and transitioning while also reducing rates for customers

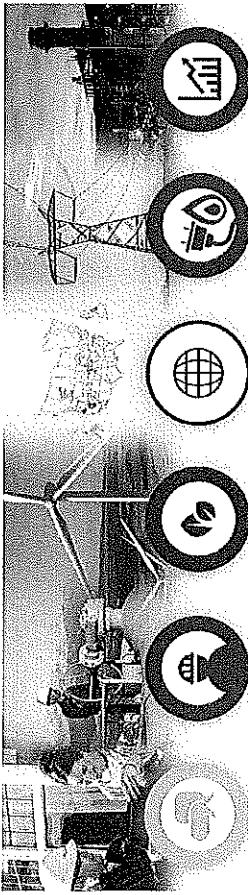


- ✓ Nevada reduced carbon emissions by 44% between 2005 and 2015
- ✓ NV Energy will be "out of coal" before California
- NV Energy's coal reduction snapshot:
 - **Coal**: 100% of electricity generated from coal
 - **Gas**: 100% of electricity generated from natural gas
 - **Renewable**: 100% of electricity generated from renewable sources
- Renewable energy growth through the utility promotes more rapid Nevada de-carbonization and large new projects (jobs, taxes, leadership)
- Since 2015, brought 474 MW of solar capacity online and contracted for another 300 MW
- Supports improving equipment and installation costs for new solar

50

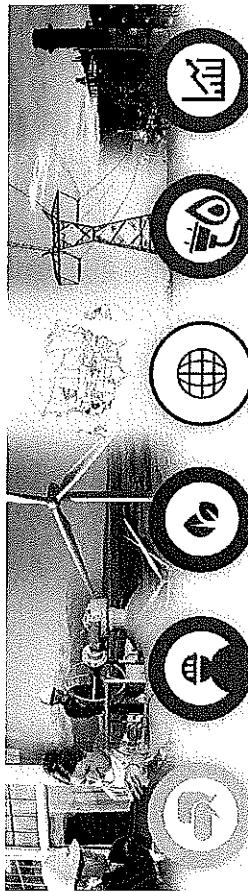
Nevada is a Leader in Provision of Low-cost Renewable Resources

- Moving forward to provide renewable energy solutions to serve existing and new load, while complying the RPS goals
- NV Energy has seen long-term PPA pricing for utility-scale solar resources between \$35 and \$40 per megawatt-hour ("MWh") - leveled cost over life of contract
- Since 2015, brought 474 MW of solar capacity online and contracted for another 300 MW
- Renewable energy growth through the utility promotes more rapid Nevada de-carbonization and large new projects (jobs, taxes, leadership)
- Supports improving equipment and installation costs for new solar



Thank you.

Questions?

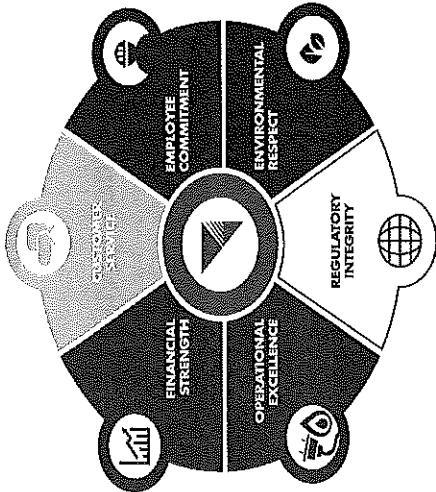


Appendix



Core Principles

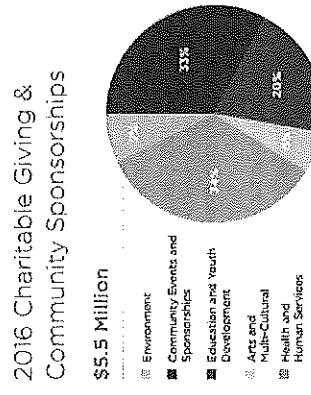
Berkshire Hathaway ownership, combined with our core principles, strengthens the company and provides for long-term sustainability



Community Commitment

We care about the communities that we serve

- In 2016, NV Energy employees volunteered more than 37,500 hours to causes statewide



| CUSTOMER | EMPLOYEE | ENVIRONMENT | RESPECT | REGULATORY | INTEGRITY | OPERATIONAL | EXCELLENCE | FINANCIAL | STRENGTH |
|--|----------|-------------|---------|------------|-----------|-------------|------------|-----------|----------|
| Designed to Meet and Exceed Customer Expectations | | | | | | | | | |
| <input checked="" type="checkbox"/> The end product resulted from the application of the plan, execute, measure and correct philosophy | | | | | | | | | |
| <input checked="" type="checkbox"/> Plan – Gathered customer feedback and applied objective assessment criteria | | | | | | | | | |
| <input checked="" type="checkbox"/> Execute – Designed website | | | | | | | | | |
| <input checked="" type="checkbox"/> Measure – Reviewed test website with focus groups | | | | | | | | | |
| <input checked="" type="checkbox"/> Correct – Revised design to eliminate 34 additional pain points | | | | | | | | | |

VISION

To be the best energy company in serving our customers, while delivering sustainable energy solutions

CULTURE

Personal responsibility to our customers

Deliver exceptional customer service across all parts of the organization, resulting in an improved customer experience, as measured by customers.

- ② Create a safer environment, on a daily basis, for customers, the general public and fellow employees by delivering an industry-leading occupational safety and health incident rate. Grow team of employees to be the best in the industry, while preparing them for industry challenges and newly created opportunities.
- ③ Reduce the impact that activities and assets have on the environment by reducing the CO₂ intensity of emissions, decreasing methane emissions and developing renewable resources to deliver a more sustainable environment in the communities where NV Energy operates and the world at large.
- ④ Actively engage external stakeholders, listening to their needs to properly develop value propositions that eliminate or reduce the need for rate increases and allow the business to achieve the allowed return on equity.
- ⑤ Operate assets in an efficient, cost-effective manner that reduces risk for the long-term benefit of customers, with gas pipeline assets experiencing zero unplanned interruptions, electric assets performing in the top quartile of reliability, and generating assets maintaining top decile industry performance, while ensuring no cyber or physical security events occur that impact operations.
- ⑥ Deliver strong financial performance, which allows for proper reinvestment in assets.

CUSTOMER EMPLOYEE ENVIRONMENT RESPECT REGULATORY INTEGRITY OPERATIONAL EXCELLENCE FINANCIAL STRENGTH

Designed to Meet and Exceed Customer Expectations

- The end product resulted from the application of the plan, execute, measure and correct philosophy

| | | |
|---|--|---|
| | | |
| We Identified customer pain points through focus groups and customer survey feedback. | ID Power Website Evaluation Study provides an industry benchmark for improvement | Based on customer feedback, we transformed and redesigned the website and mobile app. |
| | | Design Workshops Criteria |
| | | Person-to-person pain point identification and Future State envisioning |
| | | Excellence Outline |
| | | New and enhanced customer digital experiences outlined and mapped out to end |
| | | Test the Design |
| | | The redesigned customer experience was tested through customer focus groups and focused resolution of customer pain points. This feedback guided the final design for the new customer experience |



DSM Funding

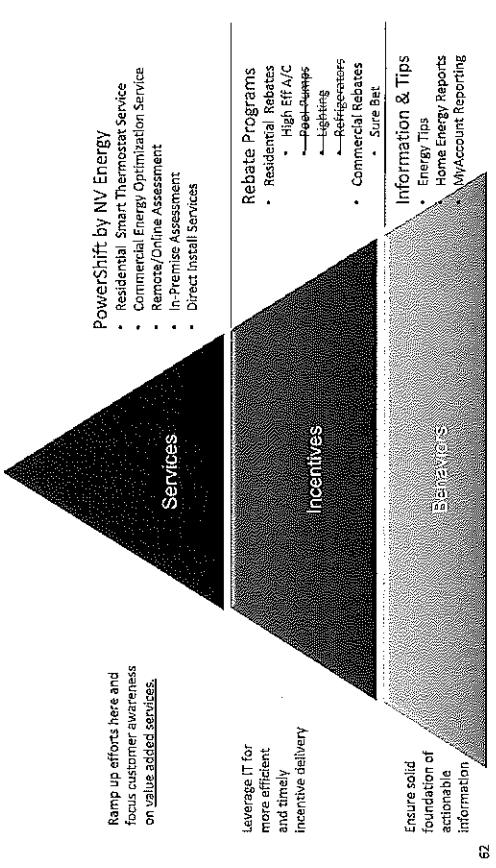
- Three-year action plan is approved in the Integrated Resource Plan
- The action plan is reviewed in non Integrated Resource Plan years, and the budget and savings are reviewed and remaining years of the action plan are approved again
- The associated costs and carrying charges are collected in a regulatory asset balancing account
- During the annual Deferred Energy Accounting Adjustment (DEAA) filing, DSM costs are approved for prudence, and the Energy Efficiency Charge (rate on bill) is reset and goes into effect on October 1 of that year
- The current Energy Efficiency Charge is \$0.001118 at Nevada Power and \$0.00181 at Sierra. The average residential customer pays approximately \$1.31/mo. at Nevada Power and \$1.34/mo. at Sierra



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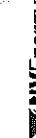
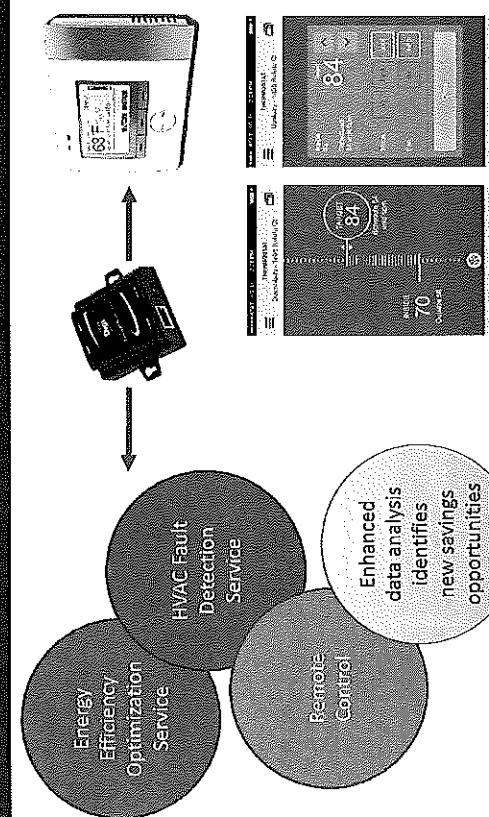
Customer Centric Energy Management

- NV Energy DSM efforts are focused on delivering higher levels of energy savings and customer satisfaction by increasing the focus on direct delivery of Energy Services that support a more efficient electric grid



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Residential Demand Response 250 Megawatts and Growing...



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NV GreenEnergy Rider Process

- The REA between NV Energy and the qualified customer sets forth a price (i.e., renewable resource rate) that the customer pays for the renewable energy attributes supplied by NV Energy. This rate must be set in a manner that subsidizes the PUCN that NV Energy's other customers are not potentially subsidizing the NGR transaction.
- Historically, this rate has been set by calculating the leveledized difference between NV Energy's costs in acquiring the renewable energy resource and NV Energy's current long term avoided costs ("LTAC"), as the LTAC is periodically calculated and filed with the PUCN.
- This rate paid by the NGR customer does not benefit NV Energy; instead it is a credit to offset higher fuel and purchased power expenses that would otherwise be borne by non-participating NV Energy customers.
- A power purchase agreement ("PPA") is also entered between NV Energy and the renewable energy supplier to support the REA with the customer.
- Both the PPA and REA are subject to the PUCN approval.
- The existing pricing methodology has been approved by the PUCN at least seven times and, therefore, has a minimum level of regulatory risk.



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Renewable Resource Rate Background

- Renewable resource rate structured such that it captures the resource cost in excess of NV Energy's applicable long-term avoided cost of energy.
 - This was the approach proposed to the PUCN and approved six times.
 - The full renewable resource rate amount attributable to the transaction above the long-term avoided cost of energy that NV Energy's customers would otherwise pay for energy. In effect, the renewable resource rate captures the "green renewable resource rate" that the participating customer would pay to avoid any adverse impacts to NV Energy's non-participating customers.
 - To ensure NV Energy captures all costs on behalf of its non-participating customers, the special contract's term will be for the life of the array, and the output of the renewable resource is not restricted in any way by the participating customer's load.



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Renewable Resource Rate Background (cont.)

- The calculation in detail.
 - Take the present value of the [25] year annual projected revenue required with respect to the renewable energy resource.
 - Take the present value of NV Energy's [25] year weighted average annual projected avoided cost of energy.
 - The difference between 1. and 2. is then converted into an annuity using a term of 25 years and a discount rate equal to NV Energy's PUCN-approved rate of return.
 - That annuity is then divided by the leveled annual production (in kilowatt-hours) of the renewable energy resource to come up with the renewable resource rate for [25] years.
- In calculating the avoided cost for this analysis, NV Energy would utilize the weighted average monthly marginal cost of energy by year using the PROMOD hourly marginal energy costs, as set forth in the most recently approved PUCN filing.



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NV GreenEnergy Rider Details

- Utilizing the NGR rate methodology approved by the PUCN for supporting a large generator service ("LGS") customer's new incremental load, NV Energy has been able to secure uniquely low NGR rates for LGS customers in southern Nevada.
 - This is due in large part to the abundant solar resource in southern Nevada and the present ability of solar developers to monetize the 30% Federal Investment tax credit ("ITC") available under Section 48 of the Internal Revenue Code.
 - As of December 2015, the 30% ITC has been extended for another five years. The developer can monetize the full 30% if construction starts before 2020, 26% if before 2021, 22% before 2022, or 10% for construction starting in 2022 or later.
- Over the past year in southern Nevada, NV Energy has seen long-term PPA pricing for utility-scale solar PV resources between \$35 and \$40 per megawatt-hour ("MWh") - leveled cost over life of contract.



Key Opportunities with NGR Program's Improvement

- Customer are interested in renewable energy options for load growth and sustainability goals
- Nevada is strategically located with industrial land attractive to new large-load customers
- The NV GreenEnergy Rider ("NGR") provides a competitive advantage to NV Energy, particularly with new technology customers—pairing low base rates with low cost renewables
- Customer demand for additional renewable energy will drive development of NGR deals
- System integration costs will be assessed for renewables penetration, and existing tariffs will need to be revised or new tariffs may be needed for creating maximum customer value
- NV Energy is being asked to pursue new transaction structures for large commercial customers that provide price certainty and the ability to match load with renewable energy
- Opportunities**
- Multiple large industrial parcels, shovel-ready lands and low costs: Tahoe-Reno Industrial Center, Apex Industrial Complex, West Henderson, and Crossroads Commerce Center
- NV Energy is key contributor to aggressive Nevada economic development team, pursuing multiple data center, distribution center and industrial process companies
- Nevada represents substantial additional solar development opportunities
 - The NGR option has been successful with the PUCN
 - NV Energy will present an option to the PUCN to offer customers long-term renewable energy purchase
- Pursue large-load economic development and support development efforts and improve NGR solution
- Leverage state, local and energy company economic development resources
- Provide creative/comprehensive renewable energy and efficiency strategies for industrial prospects
- Formalize NGR option and gain PUCN support
- Identify customer(s) to utilize option and identify renewable resource to pursue
- Partner with major developers and suppliers for transacting with customers



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 California ISO

Nevada Committee on Energy Choice

Technical Working Group on Innovation,
Technology and Renewable Energy Industries

Grid Infrastructure and Distributed Energy Resources

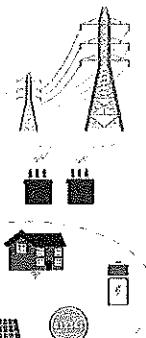
Phil Pettingill, Director, Regional Integration
October 10, 2017



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DERs are located on the distribution side of the bulk electric system.

- The ISO operates resources on the transmission grid.
- Distribution operators are responsible for DERs below the T-D interface.



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What is a Distributed Energy Resource?

- Distributed energy resources (DERs), are any resources connected on the distribution level, customer side or utility side of the customer meter.
- Some technology types of DERs can include:
 - Rooftop solar, energy storage, plug-in electric vehicles, and demand response.

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Distribution connected resources are becoming an increasingly important part of the CAISO energy resource mix

- The increasing number of DERs are due to...
 - DER technology becoming more cost effective for residential customers
 - A shift to renewable energy resources and away from convention fossil-fuel generation at all scales of the electric industry

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The ISO established the DER provider as a new type of market participant in 2015

- The DER provider owns or operates DERs that are able to fully participate in the ISO market.
- DERs can also participate in the ISO market through two models.
 - Demand response resource
 - Non-generator resource (NGR)

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DER providers can aggregate a variety of distribution connected resources to the ISO market.

- DERs in an aggregation can be connected...
 - In front of the end-use customer meter, or
 - Behind the end-use customer meter, with an additional meter on the DER
- These options open a pathway for DERs to aggregate and meet the ISO's .5 MW minimum participation requirement

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DERs participate in the ISO market as a demand response or non-generator resource

- Demand response is the direct participation of load reduction as a supply resource in the market
 - Can participate under two models:
 - Proxy Demand Response (PDR)
 - Reliability Demand Response Resource (RDRR)
- Non-Generator Resource (NGR) allows for the participation of energy storage resources
 - e.g. flywheel, lithium ion battery, electric vehicles, pumped hydro, and etc.

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Facilitating DERs -
Some examples for the local Public Utility Commission

- Broadened consumer protection rules
- Universal regulatory obligations on all LSEs
 - state policies, rate policies (NEM), provider of last resort
- Establish short and long-term adequacy obligations on all LSEs in alignment with reliability needs and state policy goals
- New interconnection rules and procedures, including DER
 - wholesale distribution access tariffs
- Access to customer information with confidentiality
 - enable DER providers to assess investments that make sense

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Appendix

- Additional Details to follow



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NGRs have the capability to serve as both generation and load.

- NGRs are able to operate similar to any generating resource in the ISO market
 - offer all market services
 - bid in both the day-ahead and real-time market
- Key benefits of NGR model:
 - Seamless bid from load to generation and back
 - Management of the state of charge (SOC) by either the ISO or the resource owner



Presentation

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PDRs are resources that offers economic bids for load reduction but is recognized like any other generator

- Can economically bid into both the day-ahead and real-time market
- Can provide the following market services:
 - Energy
 - AS non-spinning/ spinning
 - Residual Unit Commitment (RUC)



Presentation

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RDRRs are emergency response reliability resources.

- RDRRs can only economically bid in to the day-ahead market.
 - Offer uncommitted capacity and respond to a reliability event for the delivery of "reliability energy" in real-time.
- Unlike PDR, RDRR cannot economically bid in the real-time market and offer any other service such as A/S.



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Overview Of The Illinois Power Agency And Changes To The Illinois Renewable Portfolio Standard

Anthony Star
Director

Nevada Committee on Energy Choice
Technical Working Group on Innovation, Technology and Renewable Energy Industries
October 10, 2017



Background on IPA and Procurement Approach

- The Illinois Power Agency (IPA) is a state agency created in 2007 as part of resolution of debate on how to procure power for customers who did not switch to alternative suppliers (eligible retail customers)
- Entrusted by legislation to conduct procurement activities with transparency, objectivity, and in an ethical manner
- In 2011 became independent Agency under the oversight of the Illinois Executive Ethics Commission
- Funded through fees charged to utilities (for planning), suppliers (to run procurement events), and investment income from a Trust Fund
- Key responsibilities include:**
 - Developing annual procurement plan, subject to Illinois Commerce Commission (ICC) approval
 - Running procurements and programs via third-party administrators. Procurement results subject to ICC approval!

Power Procurement Approach

- Procurement of energy to meet the load requirements of "eligible retail customers"
- Criteria in the Illinois Power Agency Act:
"Develop electricity procurement plans to ensure adequate, reliable, affordable, efficient, and environmentally sustainable electric service at the lowest total cost over time, taking into account any benefits of price stability."
- Approach has been to procure each year standard energy blocks to meet 100% of expected load in the current delivery year, 50% in the following year, and 25% in the next year.
 - This allows for a multi-year laddered approach to managing supply risks
- Current serving approximately 50% of ComEd's potentially eligible load, 40% of Ameren's potentially eligible load, and 15% of MidAmerican's load
 - Municipal Aggregation main driver of customer switching



Prior IPA Renewables Responsibilities (2008-2016)

- Utilities have annual RPS percentage requirements for eligible retail customers
 - Increases each year to 25% by 2025
 - Through 2016 the IPA included in its annual procurement plan proposed procurements to meet those targets
- Alternative Suppliers also had a separate RPS responsibility (same percentage goals)
 - Payment of Alternative Compliance Payments for at least 50% of their load
 - Payment level designed to mirror the rate that eligible retail customers were paying for RPS compliance
 - Purchase of additional RECs (or self-supply) for the balance of RPS obligations
- IPA administers the Renewable Energy Resources Fund to purchase additional renewables resources (funds collected from alternative suppliers as a portion of their RPS compliance)
- In reality Illinois had multiple RPSs



The Challenges of the Original RPS

- Retail choice meant that customers could switch back and forth between utility service and alternative suppliers leading to budget and target uncertainties
 - Large wave of municipal aggregation starting in 2011 led to the majority of eligible retail customer load leaving utility service
 - Curtailment of ComEd long-term contracts in 2013 and 2014
- The Renewable Energy Resources Fund encountered challenges as funds were redirected to other purposes, and the wording of the law constrained its use



Changes Ahead!

- Public Act 99-0906 fundamentally alters the Illinois RPS
 - Move to single RPS rather than separate mechanisms for customer taking service from alternative suppliers
 - Creation of programs as well as procurements
- Existing procurement approach (utility-scale) is well tested and might not need significant modification for future procurements (although the size and scope of renewable resources to be procured will increase significantly)
- New programs will necessitate development of new approaches for distributed solar and community solar
- Other changes in law will require consideration of new policy issues



Long-term Renewable Resources Procurement Plan



- Published for comment on September 29th
 - See: www.illinois.gov/sites/ipa/Pages/Renewable_Resources.aspx
- 45 days for stakeholder comment
- 21 days to file with Commission for approval
- 120 day proceeding before Commission

What's In the Plan?

- Percentage-based targets – 25% by 2025 of retail sales
- Quantitative targets for new build
 - New utility-scale wind projects
 - New solar projects (utility-scale, brownfield, distributed)
- Procurements to meet percentage targets
- Adjustable Block Program
 - Community Solar
 - Distributed Photovoltaic Generation
- Illinois Solar for All Program (low-income customers)
- Use of existing contracts to help meet targets



Adjustable Block Programs



- Three programs
 - Distributed Generation below 10 kW, upfront payment
 - Distributed Generation between 10 kW and 2 MW, 20% payment when energized, remainder over four years
 - Community Solar, 20% payment when energized, remainder over four years
- Contracts to purchase 15 years of RECs
- Plan includes proposed approach for the determination of prices, block size/schedule, application process/criteria, ongoing credit/performance requirements, etc.
- Agency will be issuing an RFP to hire a third-party program administrator to run day-to-day operations

Illinois Solar for All Program



"The objectives of the Illinois Solar for All Program are to bring photovoltaics to low-income communities in this State in a manner that maximizes the development of new photovoltaic generating facilities, to create a long-term, low-income solar marketplace throughout this State, to integrate, through interaction with stakeholders, with existing energy efficiency initiatives, and to minimize administrative costs."

- Four specific programs
 - Low-income Distributed Generation Incentive
 - Low-income Community Solar Project Initiative
 - Initiatives for Non-profits and Public Facilities
 - Low-Income Community Solar Pilot Projects
- "Ensure tangible economic benefits flow directly to program participants"
- Targeting of funds for environmental justice communities

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What's not in the Plan



- Net metering (handled by the utilities)
- Smart Inverter rebates (handled by the utilities)
- Energy sales from renewable resources (Plan focuses on RECs)

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