



Energy+Environmental Economics

# Act 236: Version 2.0



August 7, 2018

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# Agenda / Presentation Outline

- + **Introductions**
- + **E3 Background**
- + **Brief Discussion of Rate Design Principles in the Context of DER/Solar PV\* Compensation**
- + **Review of the Current “State of the Art” on Calculating the Value of Solar**
- + ***State of the Union: Summary of Relevant DER and Retail Rate Actions across the U.S.***
- + **Next Steps**
- + **Appendix**



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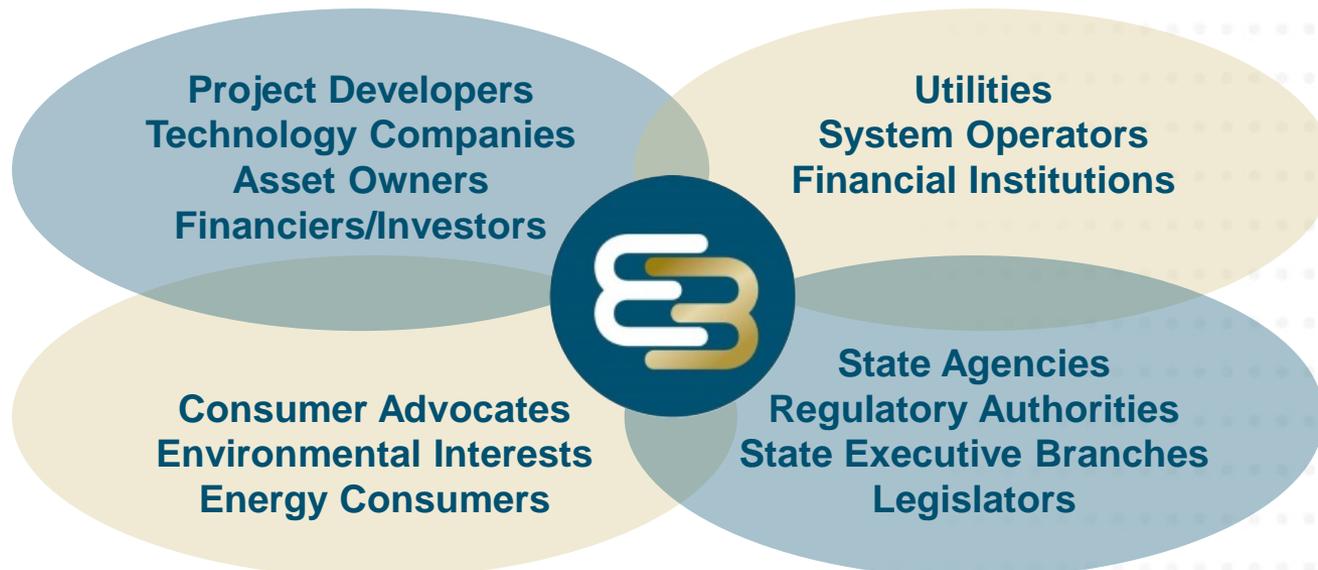
# E3 INTRODUCTION AND BACKGROUND



# About E3:

*We work across the industry and stakeholders*

- + **Founded in 1989, E3 is a leading energy consultancy with a unique 360 degree view of the industry**
- + **E3 operates at the nexus of energy, environment, and economics**
- + **Our team employs a unique combination of economic analysis, modeling acumen, and deep strategic insight to solve complex problems for a diverse client base**





# Who are we really and why we are here?

- + E3 supported ORS and the stakeholders at the time to help reach the original Act 236 settlement agreement
- + Since then we have supported ORS on Act 236 implementation and assessment as well as other issues, mostly involving avoided costs
- + We are here again to support ORS and the stakeholders (old and new) to potentially reach another agreement on “Version 2” of Act 236
- + We are extremely honored to be asked to help again on this extremely important topic and grateful for the time and financial support from all the stakeholders



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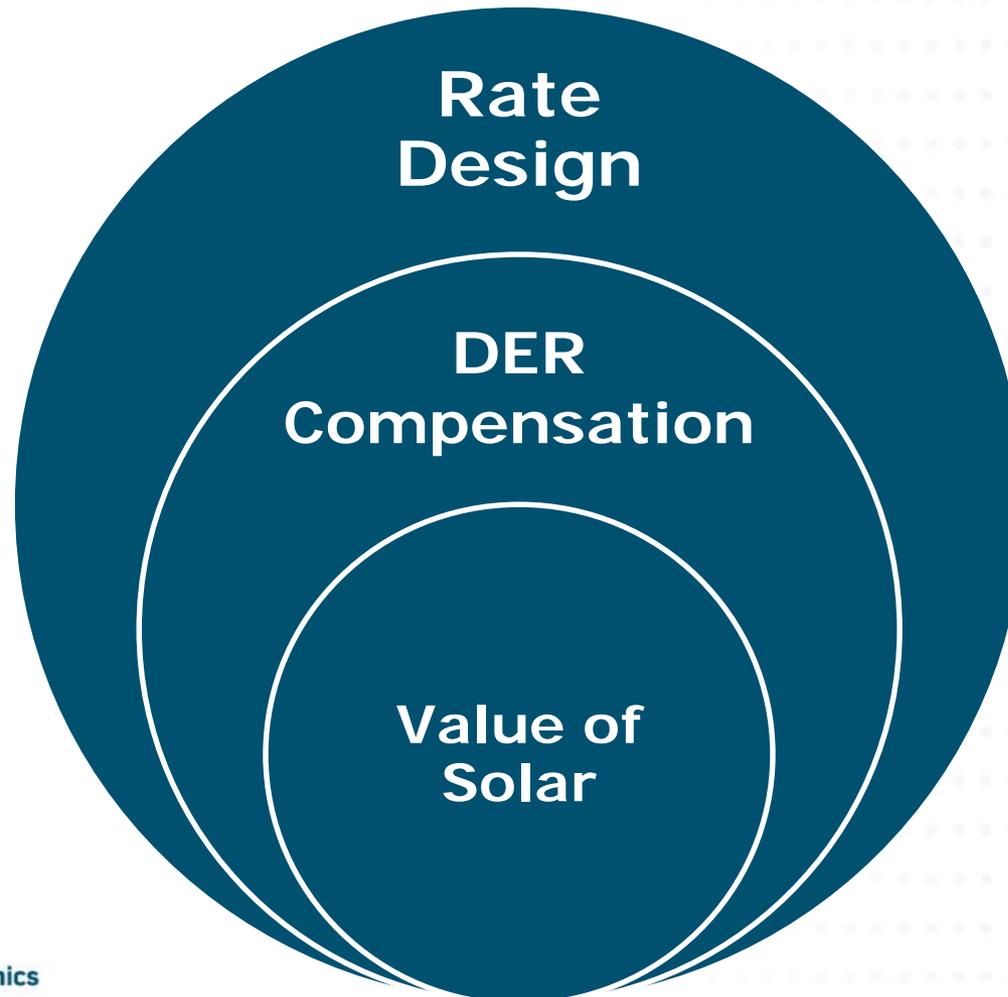
# RATE DESIGN PRINCIPLES IN THE CONTEXT OF DER COMPENSATION



# First Principle:

*Rate design encompasses many issues; some of which are related, while many others are not*

- + DER compensation and the value of solar are embedded issues within the larger set of general rate design concerns

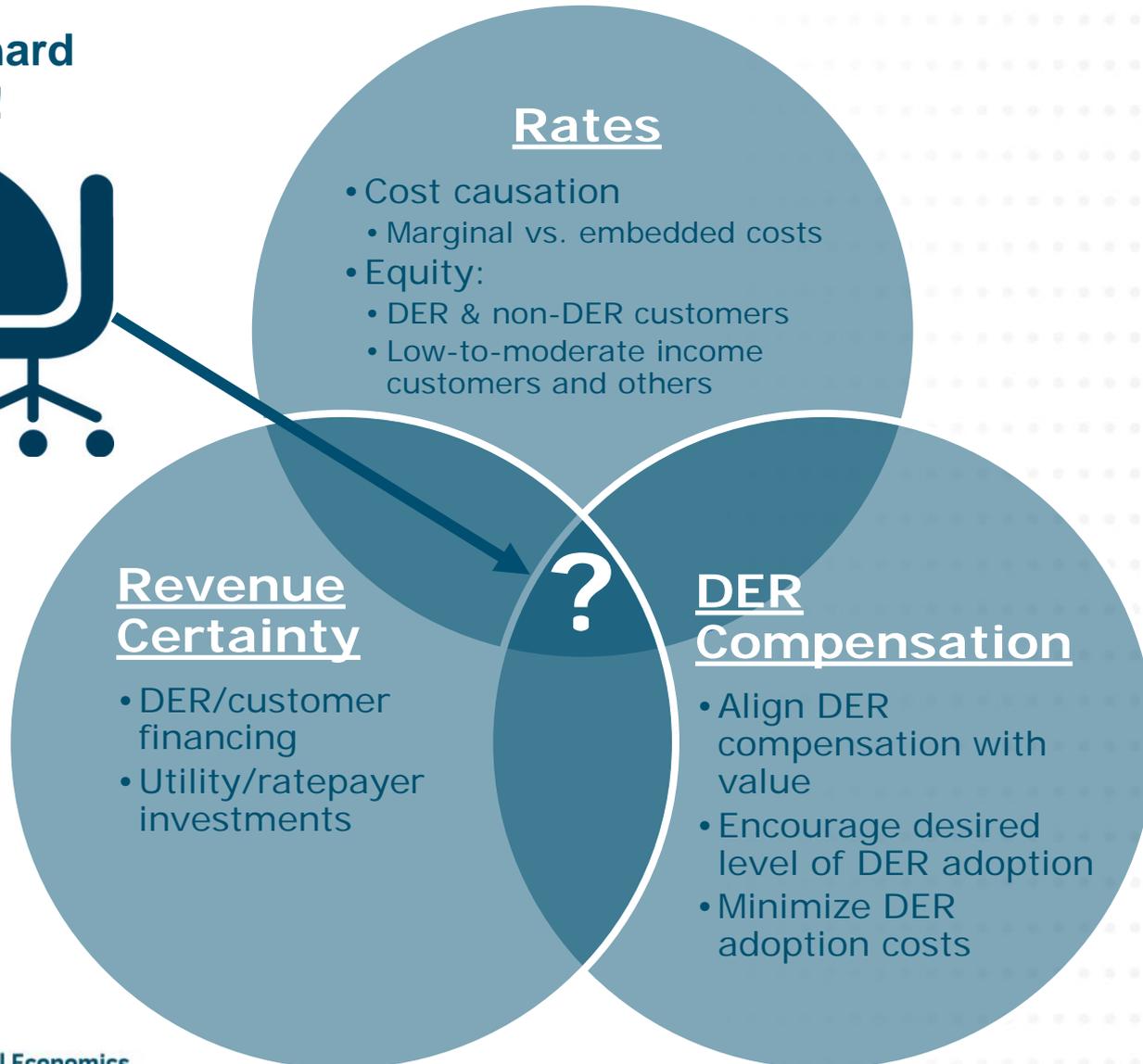




# Second principle:

*There is no perfect intersection between the “right” retail rate and the “best” type of DER compensation*

**E3 will be hard  
at work!**

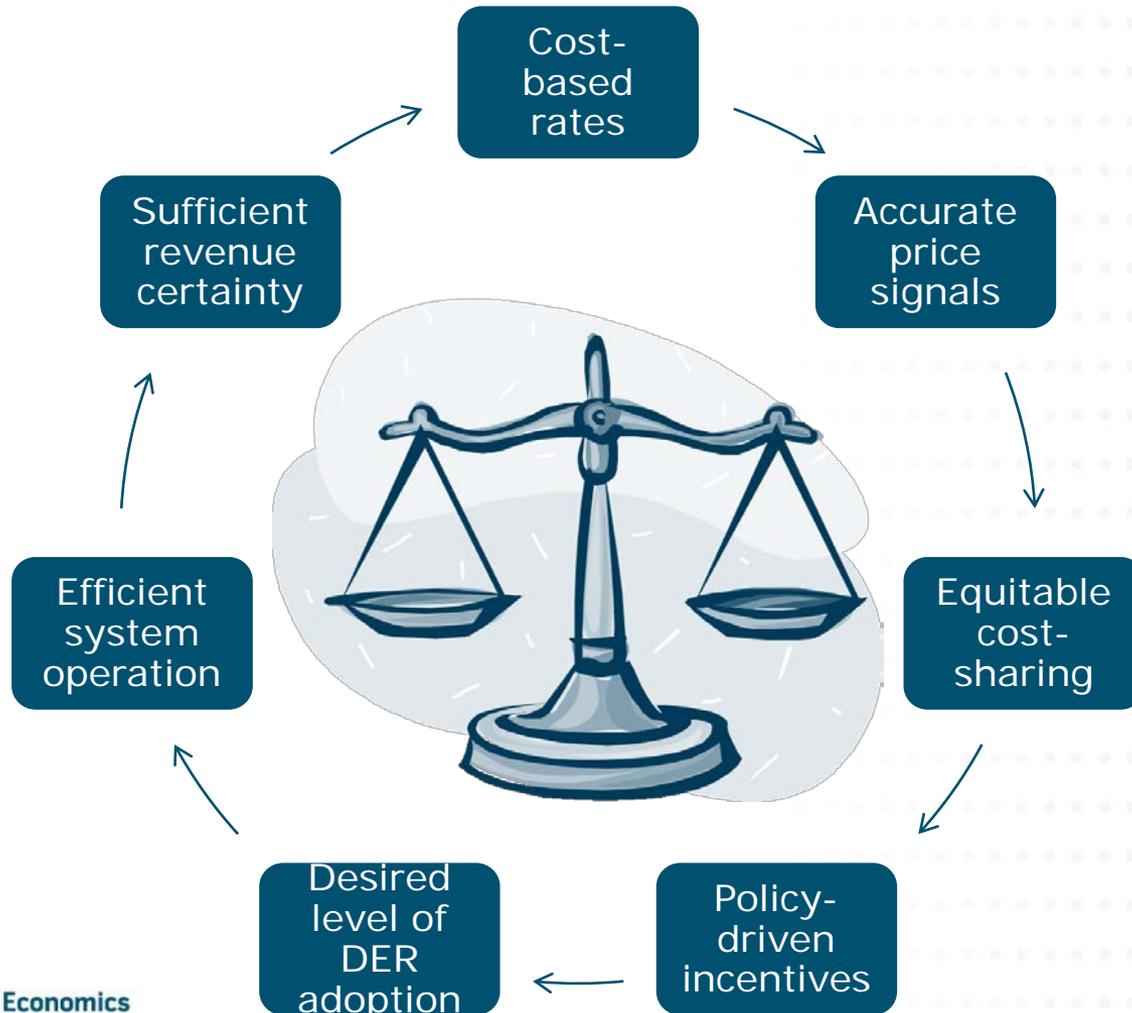




# Third Principle:

*Compromise and balance is needed for equitable and sustainable DER compensation within rate design*

- + **Goal:** Retail rates and DER compensation mechanisms that accurately reflect South Carolina values





# Here's one set of illustrative retail rate/DER compensation principles

## + Efficiency:

- Rates should promote efficient investment and consumption decisions by customers, which if tied to the utility avoided costs minimize the total costs of delivered energy to customers

## + Equity:

- Costs should be allocated fairly and equitably among customer classes and customers within the class when rate components are based on embedded costs

## + Rates should be simple, stable, understandable, acceptable to the public, and easily administered

## + Innovative rate designs should be tested prior to full scale implementation

## + Rates should support public policy, as applicable



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# CURRENT "STATE OF THE ART" WITH THE VALUE OF SOLAR



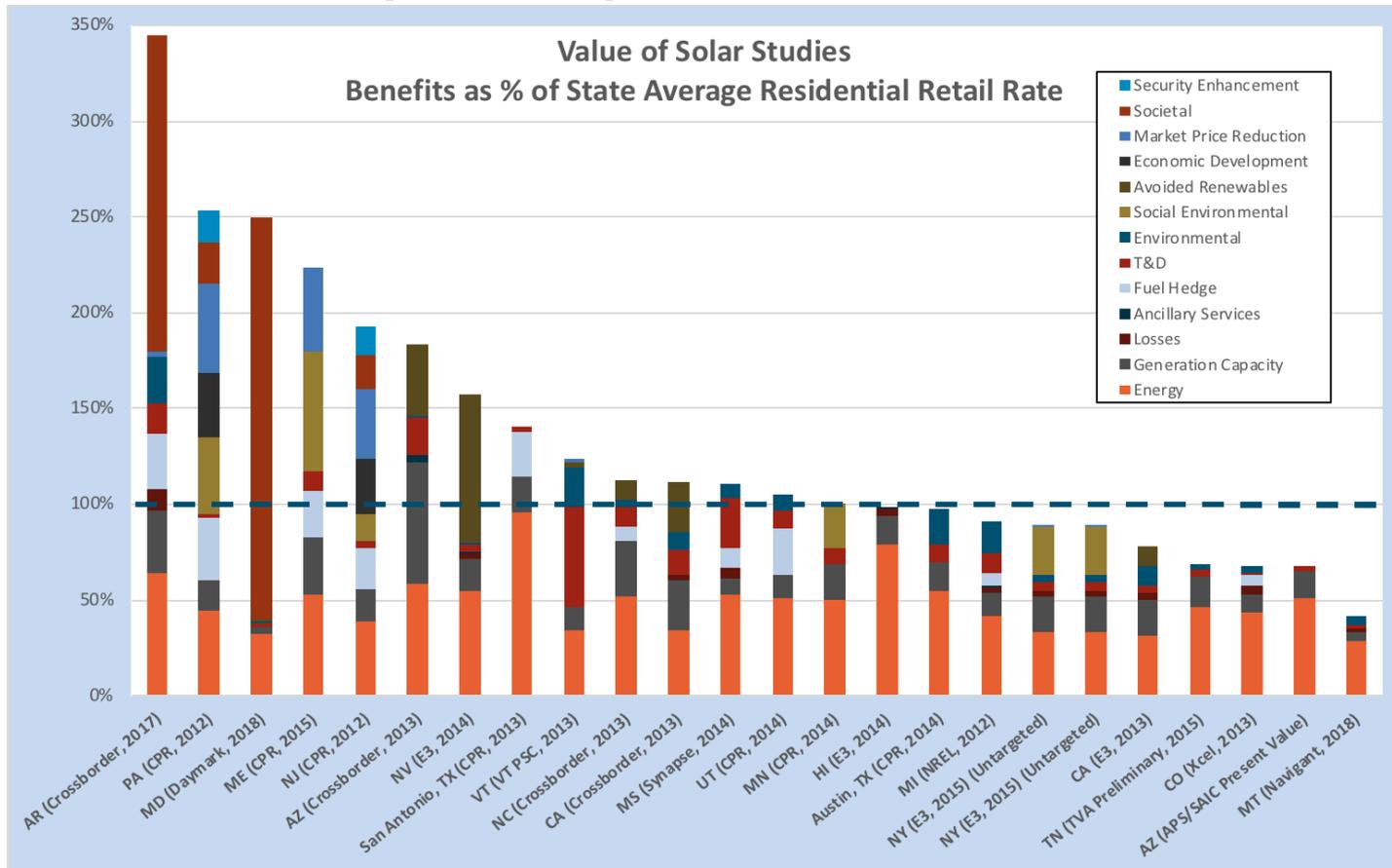
# Summary of Value of Solar/DER benefits studies

| STATE                                |                                 | STUDY                                  |                    | BENEFITS ANALYZED                         |                |                                    |                            |                        |                                |                         |                      |                           | COSTS ANALYZED                 |                |                        | BENEFIT/COST TESTS                  |                        |                                |  |                                |                                |                             |                          |   |  |  |
|--------------------------------------|---------------------------------|--|--------------------|---|----------------|------------------------------------|----------------------------|------------------------|--------------------------------|-------------------------|----------------------|---------------------------|--------------------------------|----------------|------------------------|-------------------------------------|------------------------|--------------------------------|--|--------------------------------|--------------------------------|-----------------------------|--------------------------|---|--|--|
|                                      |                                 | Avoided Energy (incl. O&M, fuel costs) | Avoided Fuel Hedge | Avoided Capacity (generation and reserve) | Avoided Losses | Avoided or Deferred T&D Investment | Avoided Ancillary Services | Market Price Reduction | Avoided Renewables Procurement | Monetized Environmental | Social Environmental | Security Enhancement/Risk | Societal (incl. economic/jobs) | PV Integration | Program Administration | Bill Savings (Utility Revenue Loss) | Utility/DER Incentives | Total Resource Cost Test (TRC) | Program Administrator/Utility Cost Test (PACT/UCT) | Cost of Service (COS) Analysis | Ratepayer Impact Measure (RIM) | Participant Cost Test (PCT) | Societal Cost Test (SCT) | Revenue Requirement Savings: Cost Ratio | Net Cost Comparison of NEM, FIT, Other |  |
| Included                             |                                 |  |                    |   |                |                                    |                            |                        |                                |                         |                      |                           |                                |                |                        |                                     |                        |                                |  |                                |                                |                             |                          |   |  |  |
| Included as a sensitivity            |                                 |  |                    |   |                |                                    |                            |                        |                                |                         |                      |                           |                                |                |                        |                                     |                        |                                |  |                                |                                |                             |                          |   |  |  |
| Represented/captured in other values |                                 |  |                    |   |                |                                    |                            |                        |                                |                         |                      |                           |                                |                |                        |                                     |                        |                                |  |                                |                                |                             |                          |   |  |  |
| ARIZONA                              | Crossborder Energy (2013)       |  |                    |   |                |                                    |                            |                        |                                |                         |                      |                           |                                |                |                        |                                     |                        |                                |  |                                |                                |                             |                          |   |  |  |
| ARIZONA                              | APS/SAIC (2013)                 |  |                    |   |                |                                    |                            |                        |                                |                         |                      |                           |                                |                |                        |                                     |                        |                                |  |                                |                                |                             |                          |   |  |  |
| ARKANSAS                             | Crossborder Energy (2017)       |  |                    |   |                |                                    |                            |                        |                                |                         |                      |                           |                                |                |                        |                                     |                        |                                |  |                                |                                |                             |                          |   |  |  |
| CALIFORNIA                           | E3 (2013)                       |  |                    |   |                |                                    |                            |                        |                                |                         |                      |                           |                                |                |                        |                                     |                        |                                |  |                                |                                |                             |                          |   |  |  |
| CALIFORNIA                           | Crossborder Energy (2013)       |  |                    |   |                |                                    |                            |                        |                                |                         |                      |                           |                                |                |                        |                                     |                        |                                |  |                                |                                |                             |                          |   |  |  |
| COLORADO                             | Xcel (2013)                     |  |                    |   |                |                                    |                            |                        |                                |                         |                      |                           |                                |                |                        |                                     |                        |                                |  |                                |                                |                             |                          |   |  |  |
| HAWAII                               | E3 (2014)                       |  |                    |   |                |                                    |                            |                        |                                |                         |                      |                           |                                |                |                        |                                     |                        |                                |  |                                |                                |                             |                          |   |  |  |
| MAINE                                | Clean Power Research (2015)     |  |                    |   |                |                                    |                            |                        |                                |                         |                      |                           |                                |                |                        |                                     |                        |                                |  |                                |                                |                             |                          |   |  |  |
| MARYLAND                             | Daymark (2018)                  |  |                    |   |                |                                    |                            |                        |                                |                         |                      |                           |                                |                |                        |                                     |                        |                                |  |                                |                                |                             |                          |   |  |  |
| MASSACHUSETTS                        | La Capra Associates (2013)      |  |                    |   |                |                                    |                            |                        |                                |                         |                      |                           |                                |                |                        |                                     |                        |                                |  |                                |                                |                             |                          |   |  |  |
| MICHIGAN                             | NREL (2012)                     |  |                    |   |                |                                    |                            |                        |                                |                         |                      |                           |                                |                |                        |                                     |                        |                                |  |                                |                                |                             |                          |   |  |  |
| MINNESOTA                            | Clean Power Research (2014)     |  |                    |   |                |                                    |                            |                        |                                |                         |                      |                           |                                |                |                        |                                     |                        |                                |  |                                |                                |                             |                          |   |  |  |
| MISSISSIPPI                          | Synapse Energy Economics (2014) |  |                    |   |                |                                    |                            |                        |                                |                         |                      |                           |                                |                |                        |                                     |                        |                                |  |                                |                                |                             |                          |   |  |  |
| MONTANA                              | Navigant (2018)                 |  |                    |   |                |                                    |                            |                        |                                |                         |                      |                           |                                |                |                        |                                     |                        |                                |  |                                |                                |                             |                          |   |  |  |
| NORTH CAROLINA                       | Crossborder Energy (2013)       |  |                    |   |                |                                    |                            |                        |                                |                         |                      |                           |                                |                |                        |                                     |                        |                                |  |                                |                                |                             |                          |   |  |  |
| NEW JERSEY                           | Clean Power Research (2012)     |  |                    |   |                |                                    |                            |                        |                                |                         |                      |                           |                                |                |                        |                                     |                        |                                |  |                                |                                |                             |                          |   |  |  |
| NEW YORK                             | E3 (2015)                       |  |                    |   |                |                                    |                            |                        |                                |                         |                      |                           |                                |                |                        |                                     |                        |                                |  |                                |                                |                             |                          |   |  |  |
| NEVADA                               | E3 (2014)                       |  |                    |   |                |                                    |                            |                        |                                |                         |                      |                           |                                |                |                        |                                     |                        |                                |  |                                |                                |                             |                          |   |  |  |
| PENNSYLVANIA                         | Clean Power Research (2012)     |  |                    |   |                |                                    |                            |                        |                                |                         |                      |                           |                                |                |                        |                                     |                        |                                |  |                                |                                |                             |                          |   |  |  |
| SOUTH CAROLINA                       | E3 (2015)                       |  |                    |   |                |                                    |                            |                        |                                |                         |                      |                           |                                |                |                        |                                     |                        |                                |  |                                |                                |                             |                          |   |  |  |
| TENNESSEE                            | TVA (2015)                      |  |                    |   |                |                                    |                            |                        |                                |                         |                      |                           |                                |                |                        |                                     |                        |                                |  |                                |                                |                             |                          |   |  |  |
| TEXAS (AUSTIN)                       | Clean Power Research (2014)     |  |                    |   |                |                                    |                            |                        |                                |                         |                      |                           |                                |                |                        |                                     |                        |                                |  |                                |                                |                             |                          |   |  |  |
| TEXAS (SAN ANTONIO)                  | Clean Power Research (2013)     |  |                    |   |                |                                    |                            |                        |                                |                         |                      |                           |                                |                |                        |                                     |                        |                                |  |                                |                                |                             |                          |   |  |  |
| UTAH                                 | Clean Power Research (2014)     |  |                    |   |                |                                    |                            |                        |                                |                         |                      |                           |                                |                |                        |                                     |                        |                                |  |                                |                                |                             |                          |   |  |  |
| VERMONT                              | Vermont PSC (2013)              |  |                    |   |                |                                    |                            |                        |                                |                         |                      |                           |                                |                |                        |                                     |                        |                                |  |                                |                                |                             |                          |   |  |  |



# Value of Solar components

- + Many potential value/benefit components for solar
- + Which and how many components are analyzed has fundamental impact on perceived value of solar





# MD and MT Value of Solar studies are the most recent and wildly divergent



## Maryland

## Montana

### Benefits

- Energy
  - +Market price reductions
- Capacity
- T&D
- Losses
- Carbon compliance
  - +NOx / SOx compliance
- Societal (economic, health, non-monetized carbon)
- Avoided fuel hedging
- Avoided REC compliance

### Costs

- Not considered

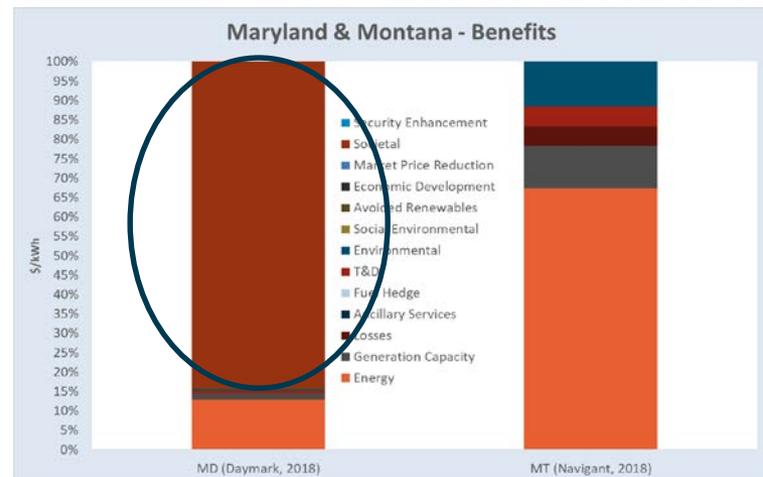
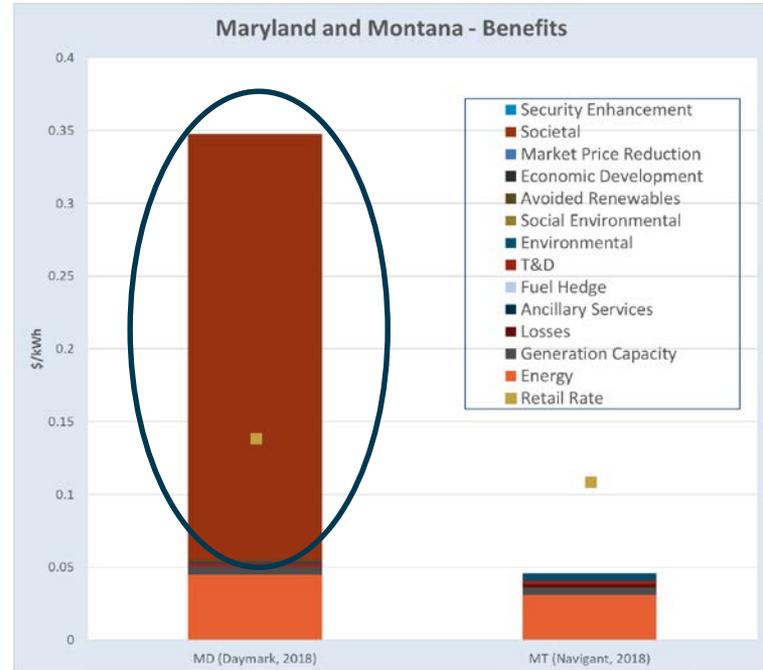
### Benefits

- Energy
- Capacity
- T&D
- Losses
- Carbon compliance

### Costs\*

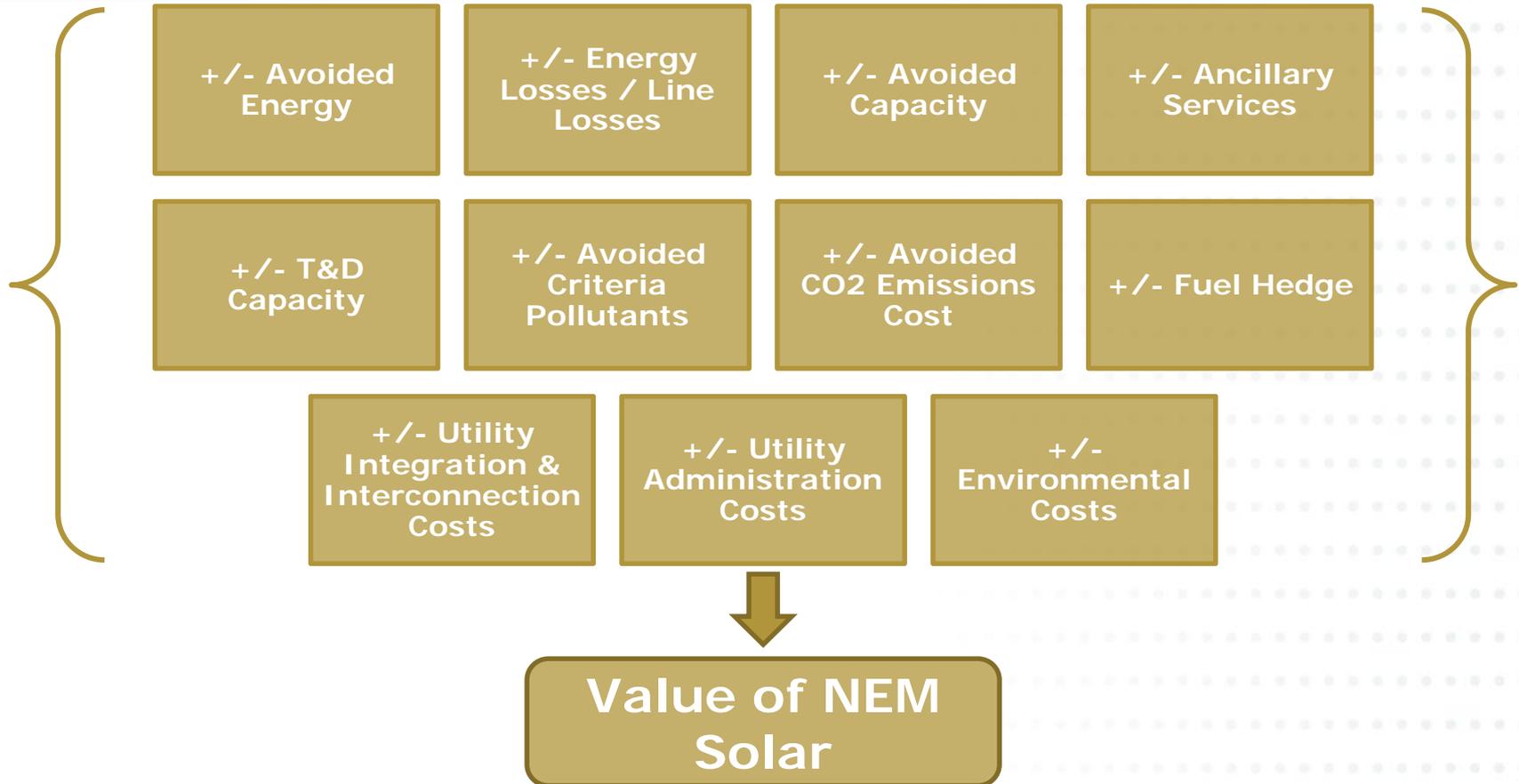
- Bill savings (lost utility revenues)
- Administrative

\*Not shown in these charts, the costs calculated in the MT study total to \$0.11/kWh





# Reminder: Act 236 NEM Methodology



1:1 NEM @  
Retail Rate

-

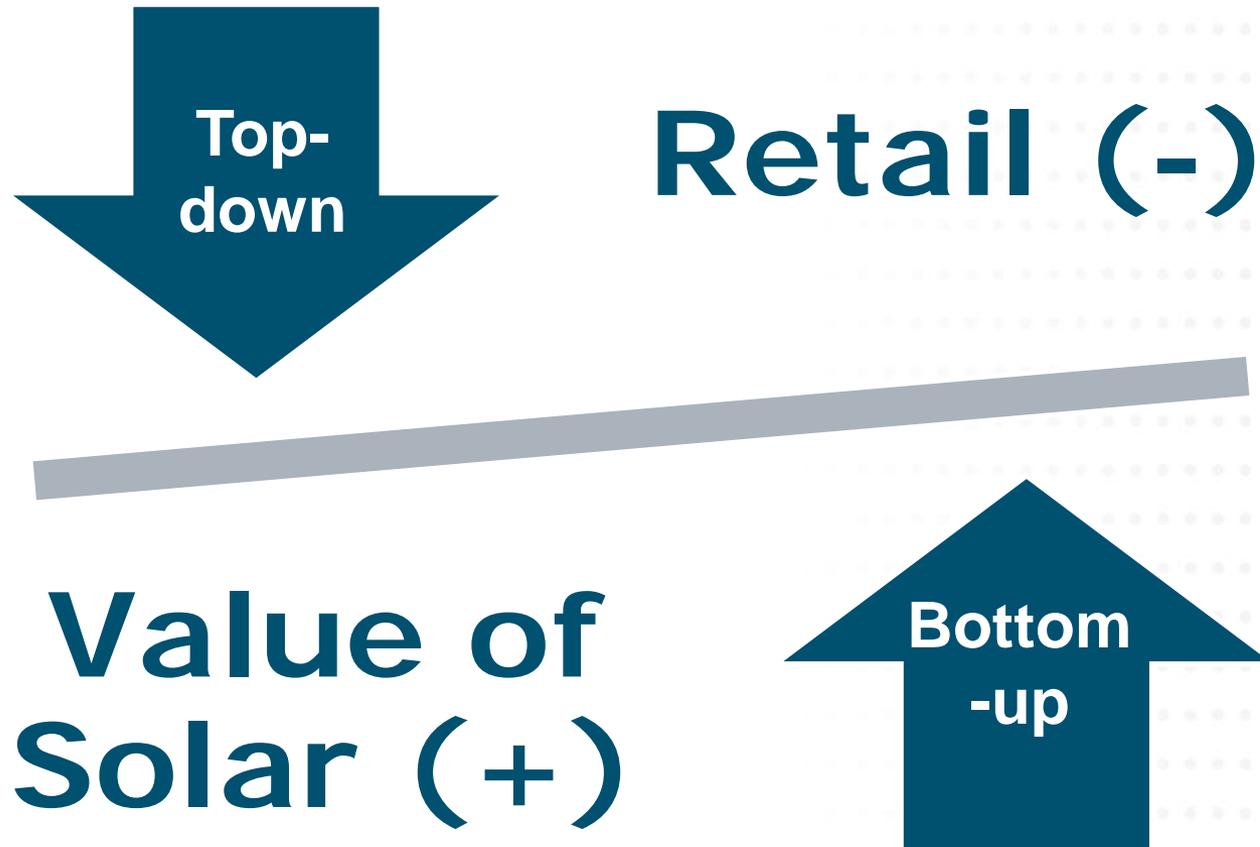
Value of NEM  
Solar

=

Cost/Revenue  
Shift



# Ultimately there are two approaches to DER/solar compensation





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# *STATE OF THE UNION*



# Action on retail rates, DERs, and NEM is nationwide

Figure 1. 2017 Action on Net Metering, Rate Design, & Solar Ownership Policies

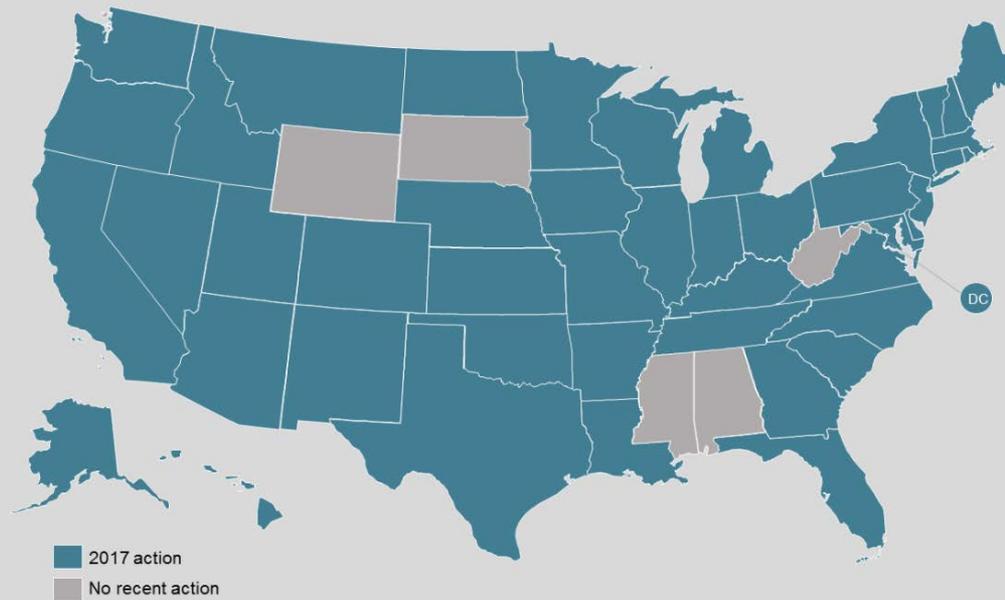


Table 1. Q2 2018 Summary of Policy Actions

| Policy Type                                       | # of Actions | % by Type   | # of States           |
|---|--------------|-------------|-----------------------|
| Residential fixed charge or minimum bill increase | 46           | 31%         | 25                    |
| DG compensation rules                             | 39           | 26%         | 23 + DC               |
| Community solar                                   | 25           | 17%         | 17                    |
| DG valuation or net metering study                | 20           | 14%         | 16 + DC               |
| Residential demand or solar charge                | 11           | 7%          | 5 + DC                |
| Third-party ownership of solar                    | 4            | 3%          | 2 + DC                |
| Utility-led rooftop PV programs                   | 3            | 2%          | 3                     |
| <b>Total</b>                                      | <b>148</b>   | <b>100%</b> | <b>42 States + DC</b> |

Note: The “# of States/ Districts” total is not the sum of the rows, as some states have multiple actions. Percentages are rounded and may not add up to 100%.



# Majority of recent DER action is moving beyond NEM status quo

## Maintaining the Status Quo

**Nevada legislature restored statewide retail NEM**

Florida PSC approved solar leasing

## Transitions & Revisions

**New York adopted more value-based compensation for certain types of DER**

**Hawaii revised NEM successor tariffs to encourage storage adoption**

Maine legislature changed NEM to buy-all / sell-all structure (w/ decreasing credit value each year)

**Arizona regulators replaced NEM w/ Net Billing at avoided cost**

Utah regulators approved a Net Billing transition tariff (with rates slightly below retail)

Massachusetts DPU approved mandatory demand charge for residential DG customers

Idaho PUC permitted Idaho Power to create separate DG customer class

**California mandated new homes post-2020 will be required to install solar**

Connecticut legislature voted to replace NEM w/ a buy-all / sell-all rate structure

State regulators largely resisted utility-requested fixed charge increases (see Appendix for details)

## Community Solar

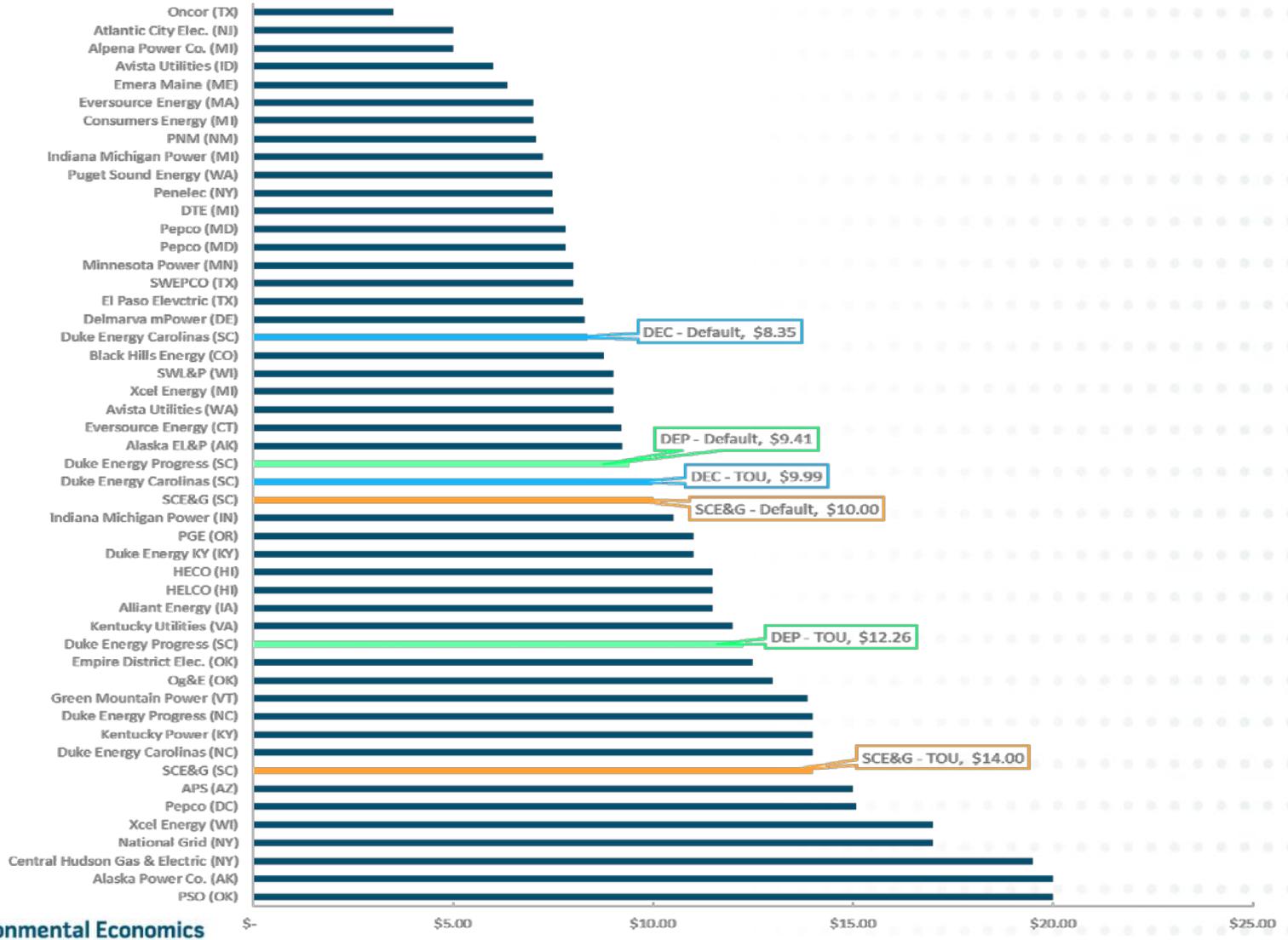
Duke Energy (NC) and Dominion Virginia Power proposed / launched community solar plans

\*Actions with which E3 is or has been involved



# There is also a lot of action with residential customer fixed charges

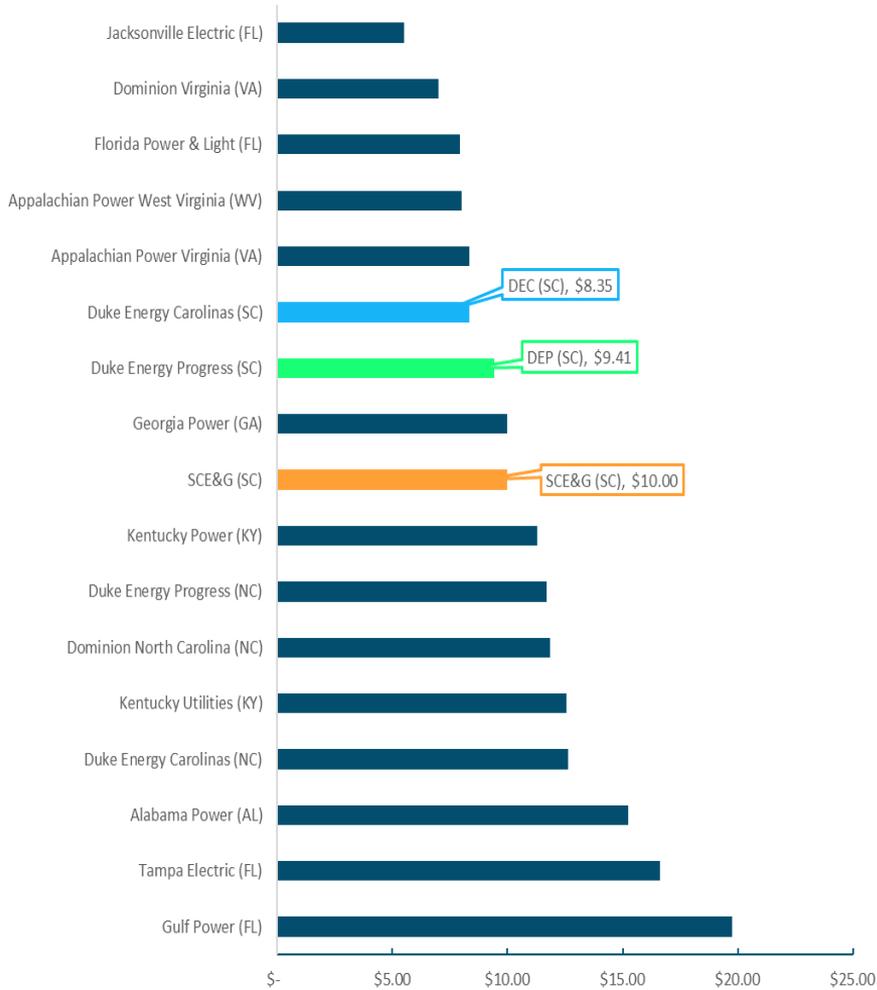
## SC Fixed Charges vs. 2017/2018 GRC Approvals



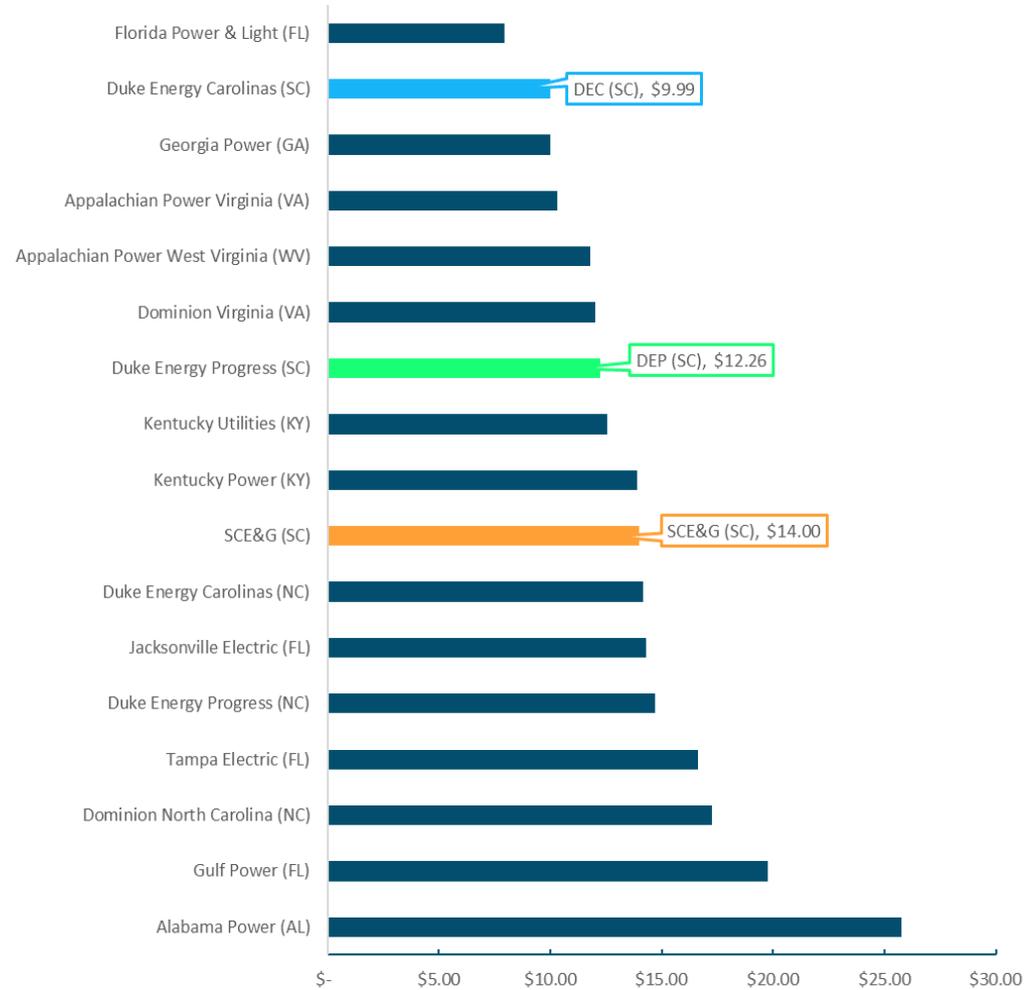


# One thing to note is that SC utilities have similar fixed charges

### Fixed Charges in the Southeast: Default Residential Service



### Fixed Charges in the Southeast: Residential TOU Service





# Summary of general relevant trends

- + **Full retail NEM is becoming the exception rather than the rule**
  - However, most jurisdictions are taking a gradual approach away from 1:1 retail rate NEM following a glide path to minimize market/customer disruption
- + **Numerous jurisdictions are rethinking their approach to valuing DERs, especially in the context of solar and new emerging technologies like batteries and electric vehicles, with broad variation in approaches and outcomes**
- + **Proposed fixed charge increases are increasingly common; however, these requests are often either scaled back or denied outright**



# Case Study: Louisiana



## RETAIL (-)

| NEM Cap   | Compensation   | Max. System Size  |
|---|--|---|
| None: previous cap at 0.5% of retail demand removed in Dec 2016 | <ul style="list-style-type: none"> <li>Systems registered prior to the NEM cap: 1:1 retail credit*</li> <li>Systems registered after NEM cap reached: compensation for excess generation at avoided-cost rate**</li> </ul> | <ul style="list-style-type: none"> <li>Residential: 25 kW</li> <li>Commercial/Agricultural: 300 kW</li> </ul> |

\*NEM credits "roll over" month-to-month; if credits remain at time of service/account ending, paid out at avoided cost

\*\*Avoided-cost rate in Louisiana: commodity rate , plus any locational, capacity-related, or environmental benefits

- + Prior to 2016, customers received full retail NEM**
- + Beginning 2016, compensation for excess generation reduced to average-cost rate**
- + Currently a buy all / sell all compensation structure is under consideration**



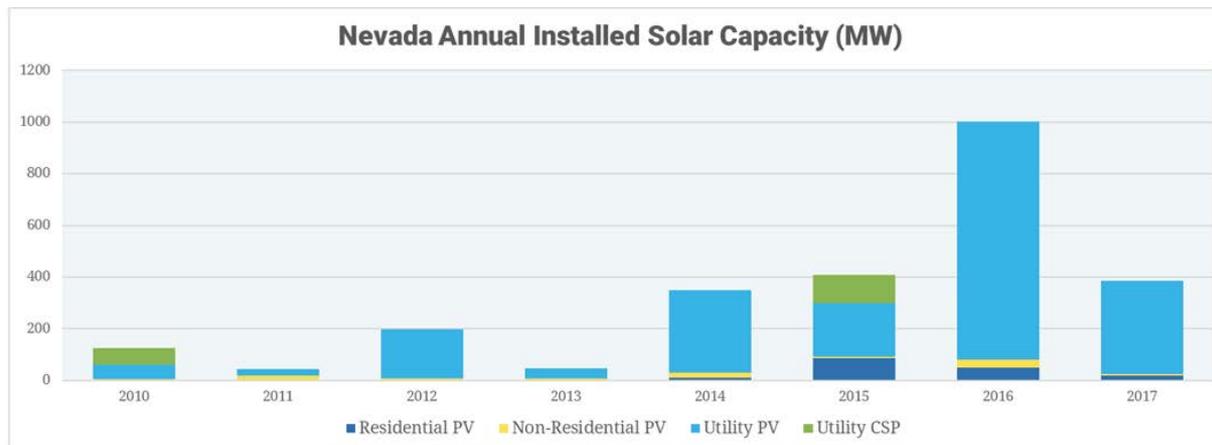
# Case Study: Nevada

RETAIL (-)

| NEM Cap        | Compensation        | Max. System Size                                    |
|----------------|---------------------|---|
| None (removed) | 95% of retail rate* | 1 MW or 100% of customer's annual electricity usage |

\*NEM credits decline by 7% for each 80 MW of DG PV installed, until reaching 75% of the retail rate

- + 2015 PUC decision ended retail NEM
- + 2017 legislation restored NEM to near-retail levels
- + Highly political and combative environment





# Case Study: Missouri



RETAIL (-)

| NEM Cap                               | Compensation  | Max. System Size |
|---------------------------------------|---|------------------|
| 5% of utility's single-hour peak load | Net excess generation compensated at avoided-cost rate* | 100 kW           |

\*NEM (avoided-cost) credits expire after 12 months or upon service termination

- + April 2018: PSC staff submitted report in grid modernization proceeding recommending more detailed analysis of DER costs/benefits**
- + June 2018: SB 564 provides \$28M in solar rebates beginning 2019**



# Case study takeaways

- + **Each case represents a compromise by various stakeholders although the balance between stakeholders and how that compromise was achieved can vary substantially**
  - Utility
    - Nevada: near-retail rate compensation for NEM customers after NEM was initially eliminated
    - Missouri: increased funding for solar rebates
  - Solar industry
    - Nevada: haircut to NEM compensation, increasing over time
  - Environmental groups
  - Others?
- + ***What compromises can be put on the table as we move forward to Act 236 Version 2.0?***



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# NEXT STEPS



# There are many compromise options:

*Remember as we search for the right compromise we should try to rely on sound data and analytics!*

## + Retail (-)

- This can include increased fixed charges or minimum bills to better reflect utility cost to serve

## + Value of Solar (+)

- This could be compensation directly tied to the NEM formula similar to a QF-style tariff

## + TOU rates to better reflect more dynamic energy costs

## + "Transition" tariffs with phased energy credits

- Retail rates → transition credits → embedded/avoided cost rate

## + Reduction in NEM value

- 95% → 90% → 85% → ?

## + Asymmetric compensation

- Self-consumption and net export valued differently, e.g. at retail vs. avoided costs

## + Distinct DER/solar adopter customer rate class

## + Support/protection for low-to-moderate income customers

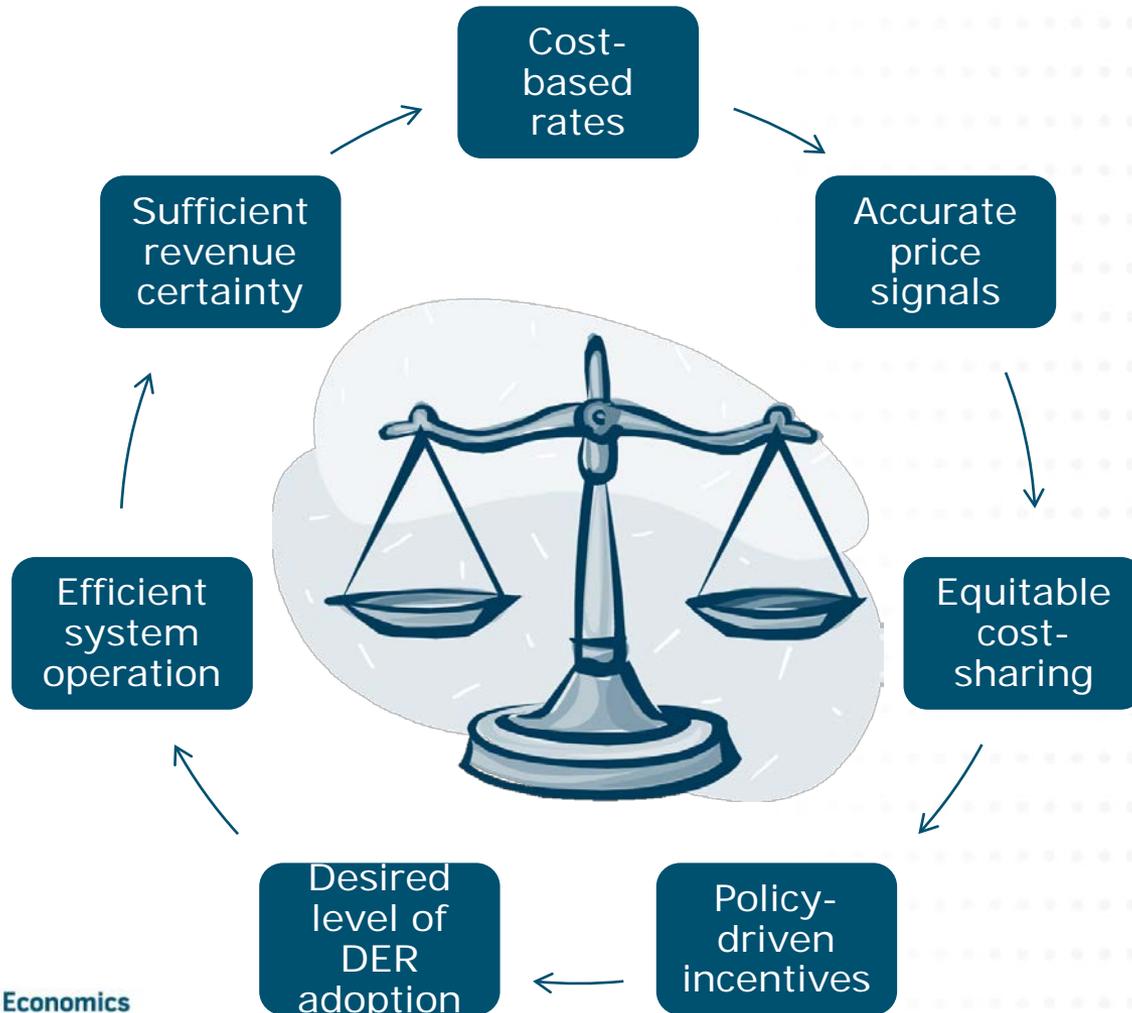
- For example: grants, financing, direct subsidies, community solar, bill protection, cost / revenue shift caps, etc.



# Remember where we started?

*Are we any closer?*

- + **Goal:** Retail rates and DER compensation mechanisms that accurately reflect South Carolina values





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# THANK YOU!

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# APPENDIX



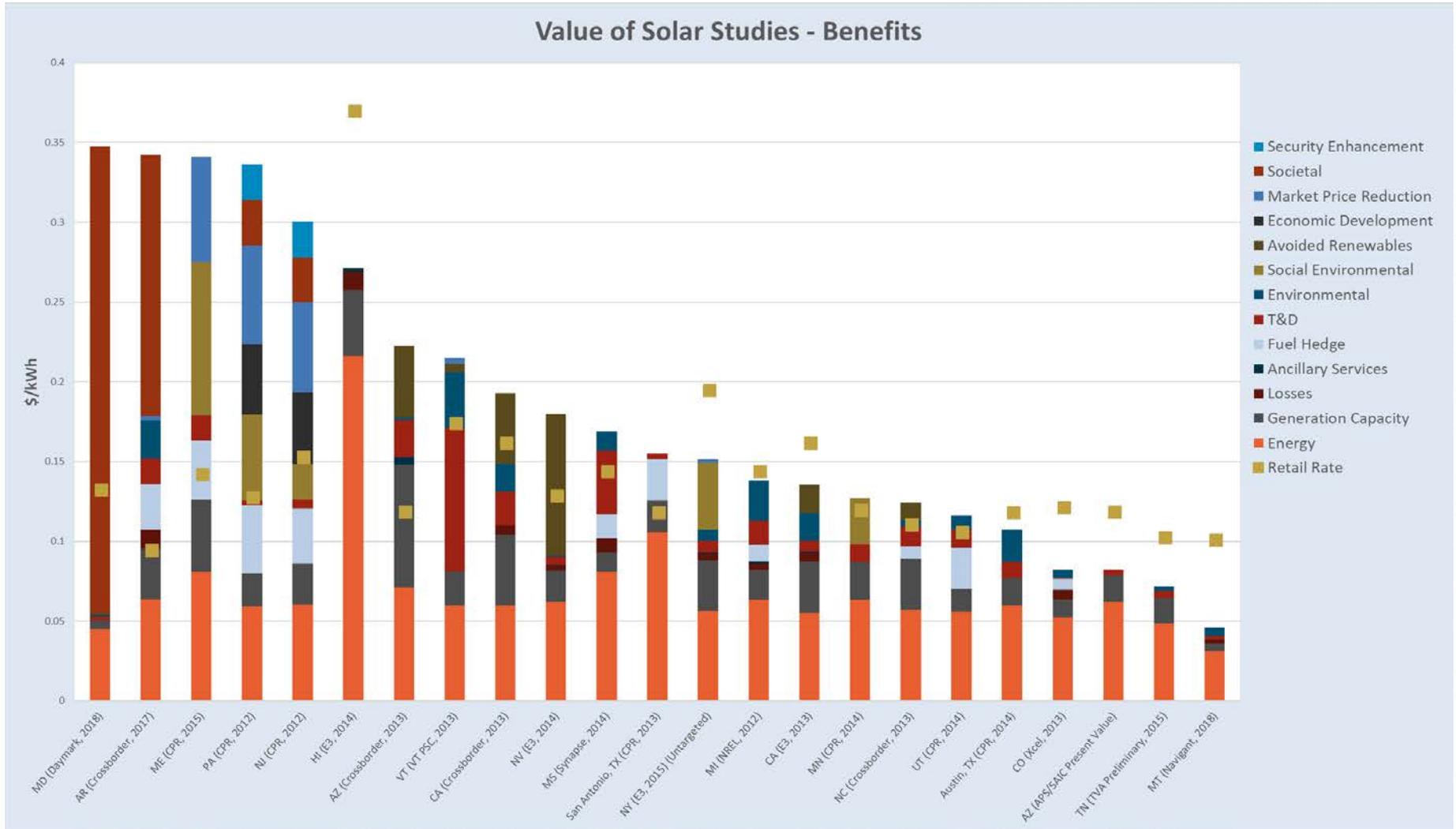
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# VALUE OF SOLAR STUDIES



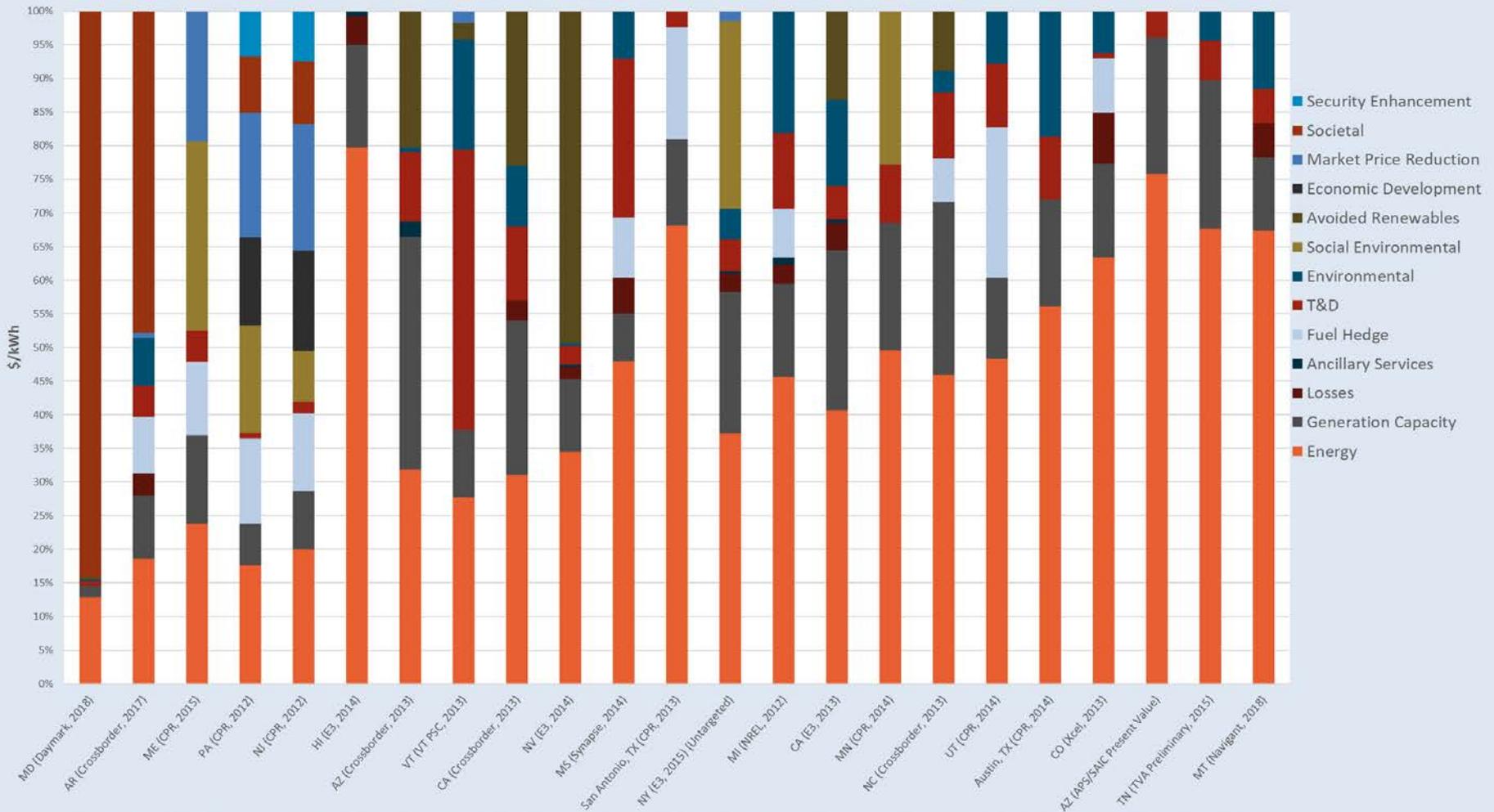
# VoS studies range broadly in their benefits assessments (1)





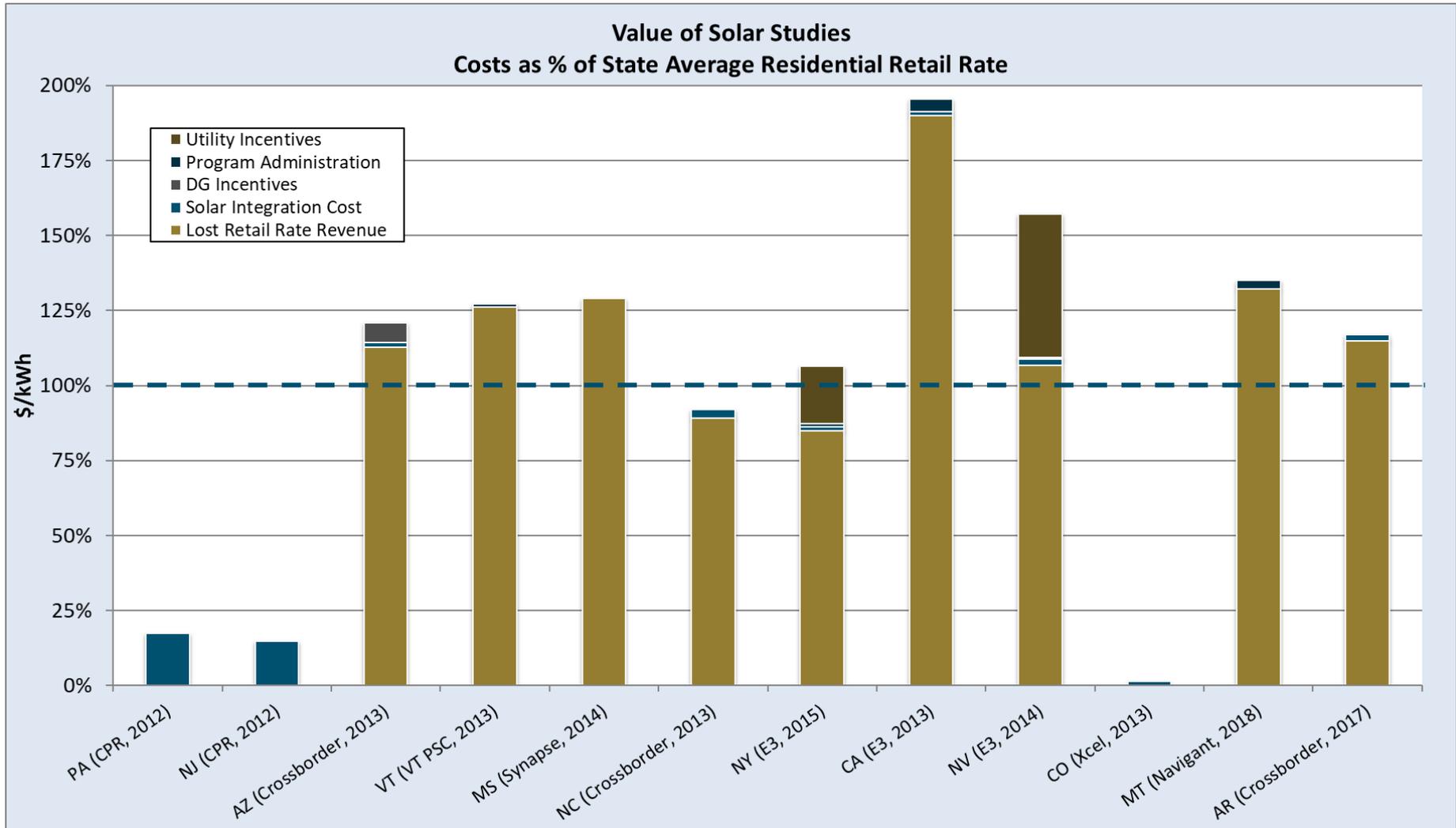
# VoS studies range broadly in their benefits assessments (2)

## Value of Solar Studies - Benefits



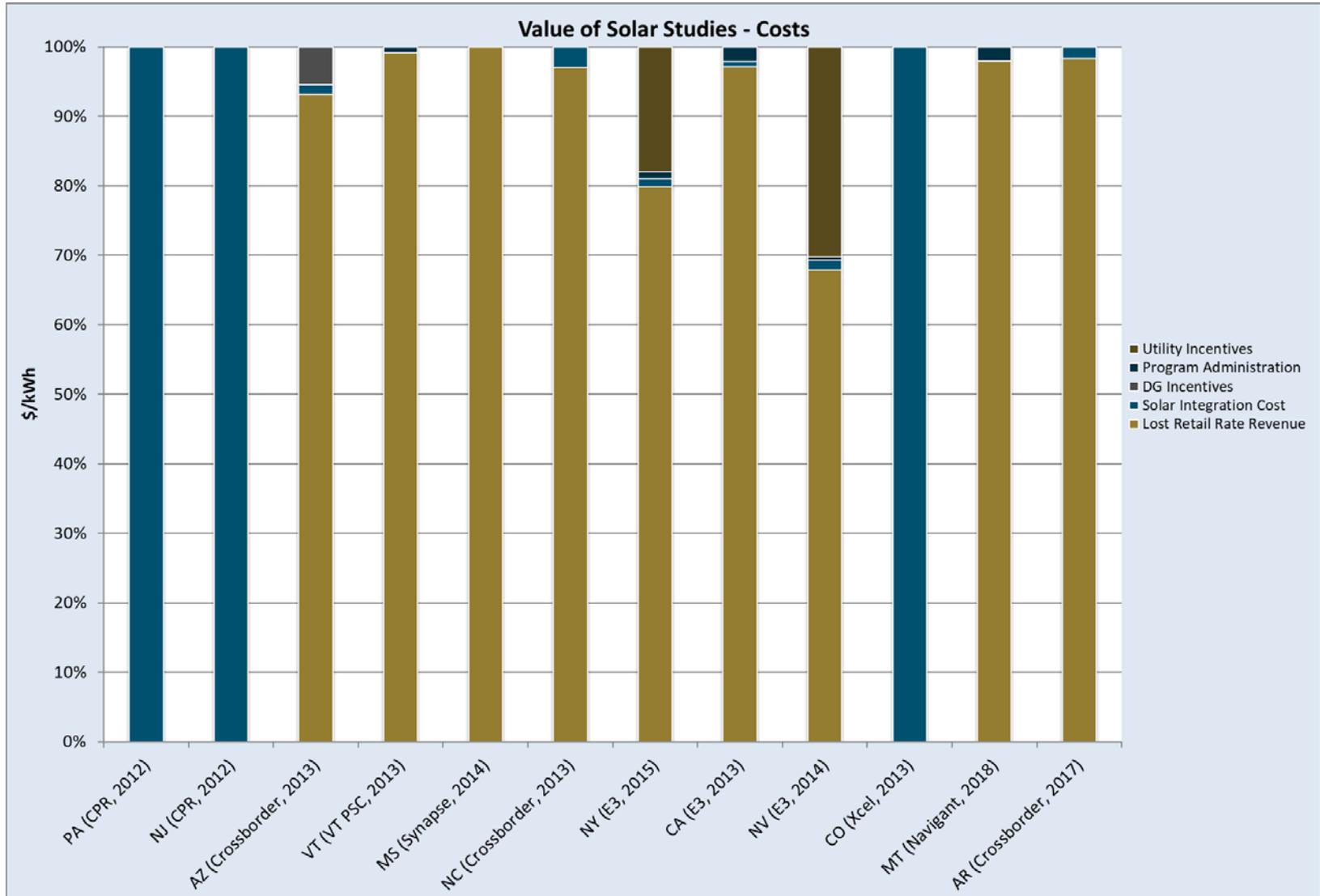


# Cost assessments also range broadly (1)





# Cost assessments also range broadly (2)





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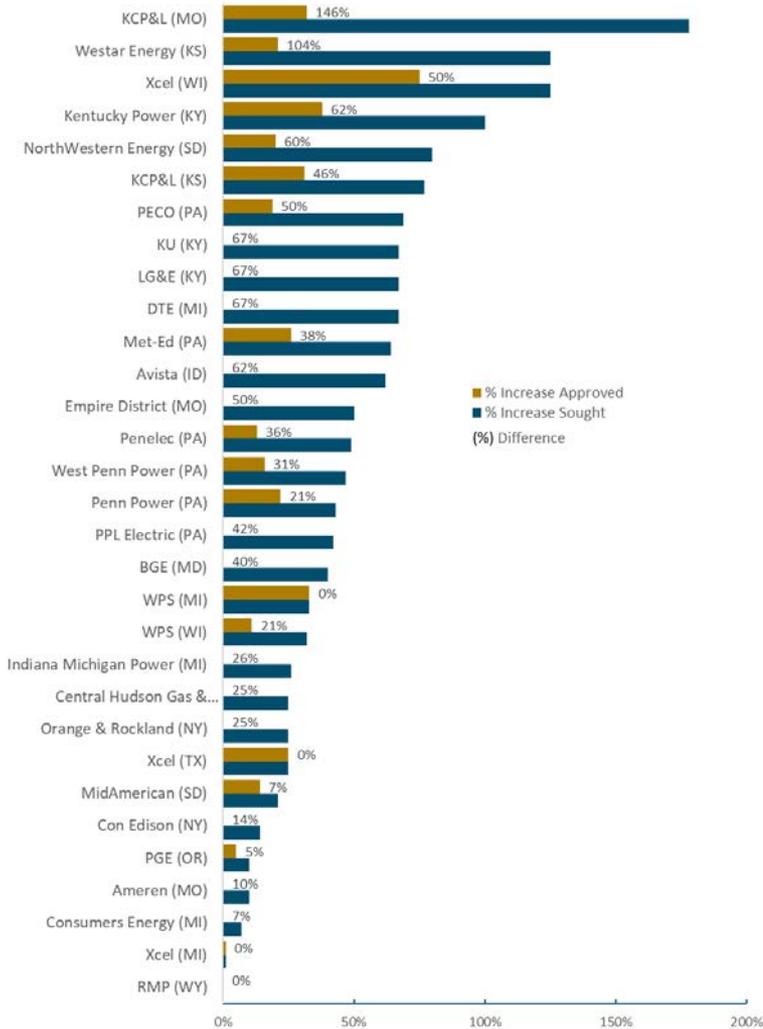


# FIXED CHARGES

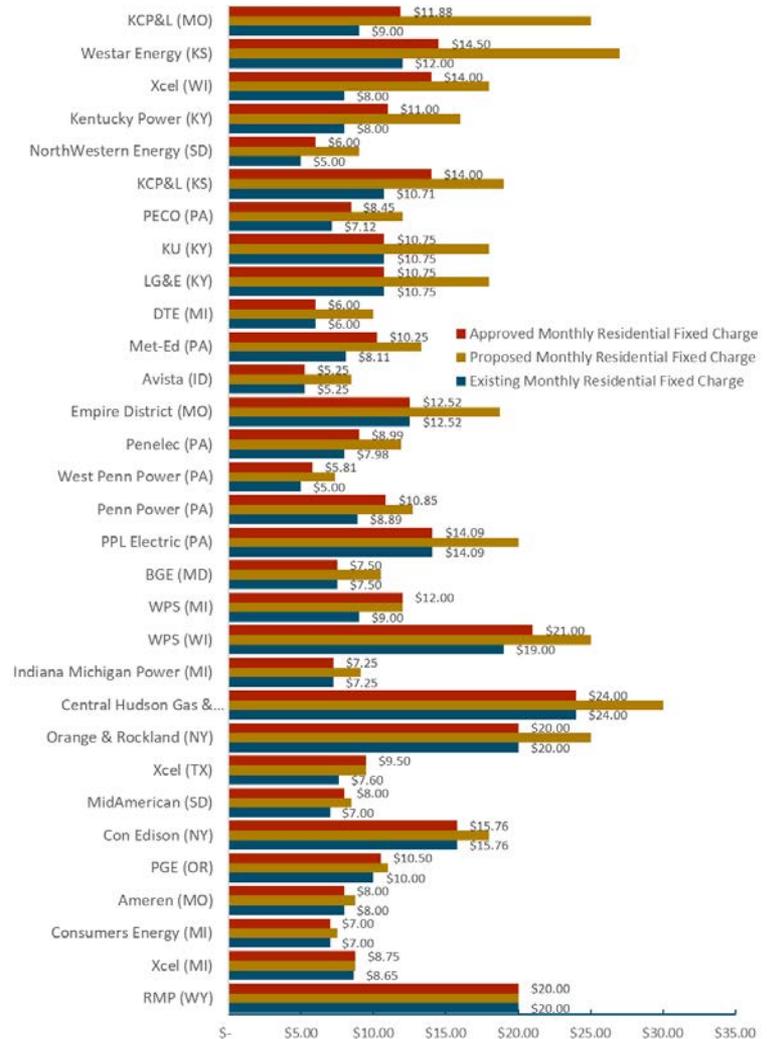


# 2015 Residential Fixed Charge Increases

2015 Percentage Increase in Residential Fixed Charge



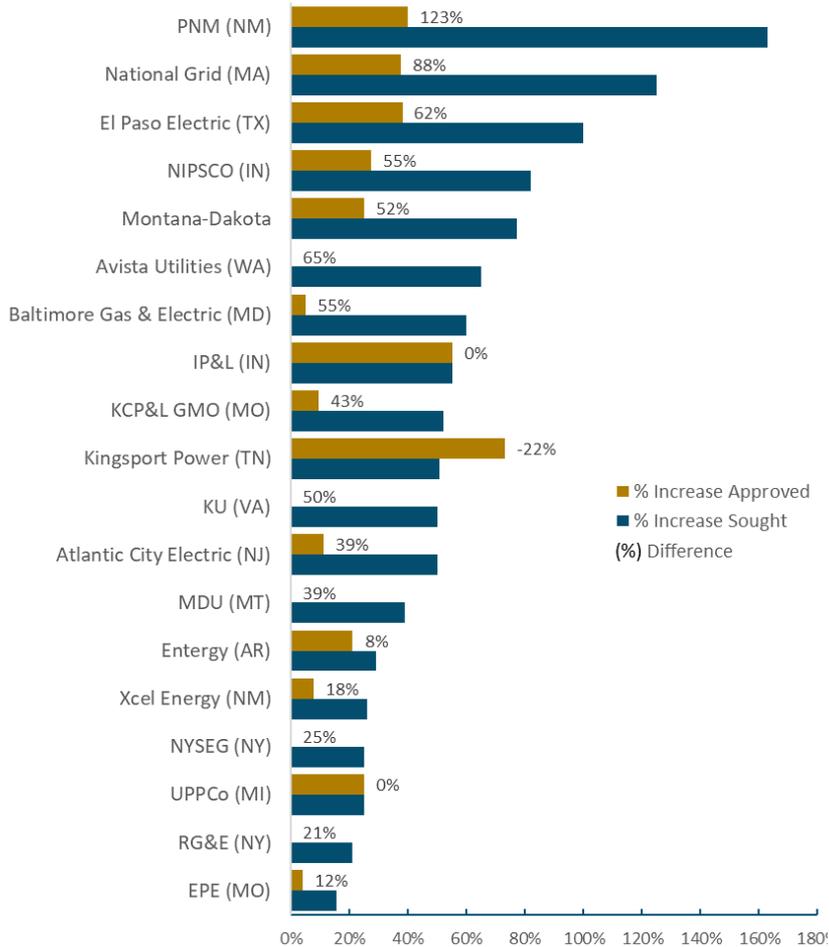
2015 Residential Fixed Charge Increases



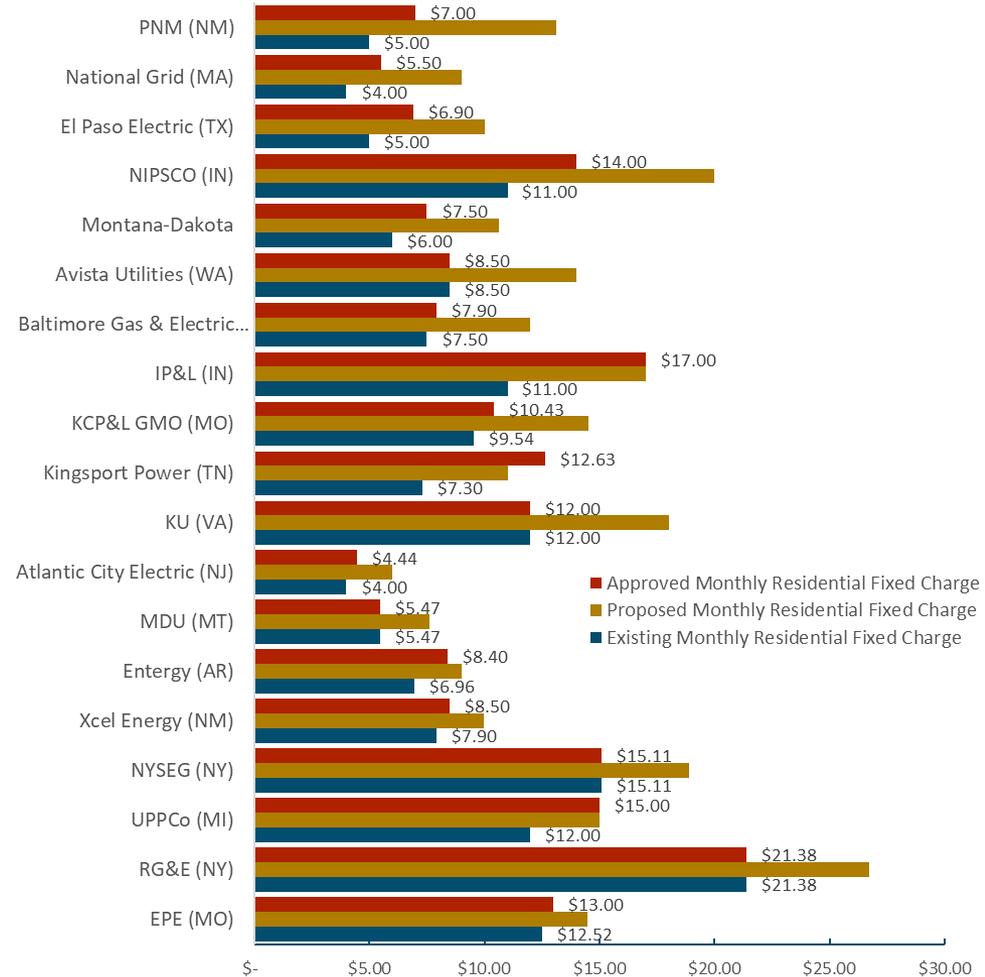


# 2016 Residential Fixed Charge Increases

2016 Percentage Increase in Residential Fixed Charge



2016 Residential Fixed Charge Increases





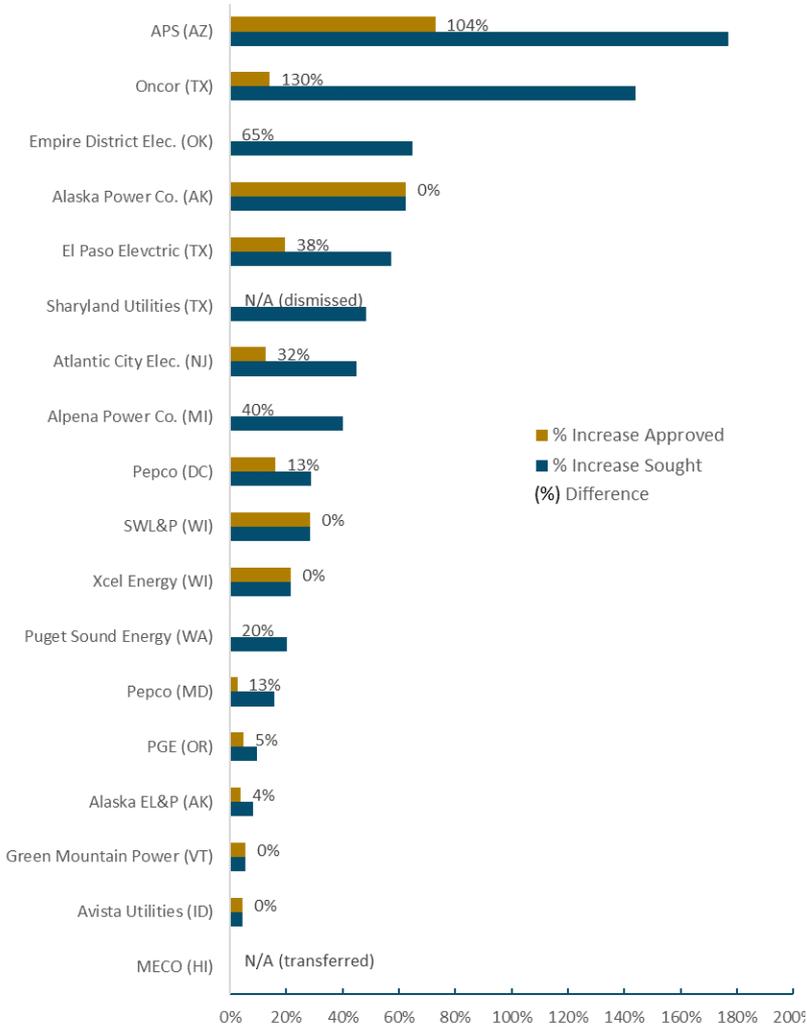
# 2015/16 Trends

- + Percentage increases approved in 2015 range from 1% (25¢) to 75% (\$6)
- + Percentage increases approved in 2016 range from 4% (48¢) to 73% (\$5.33)
- + In the case of the 75% increase, the increase approved exceeded proposed increase
- + Increase cut across several jurisdictions, except in New York

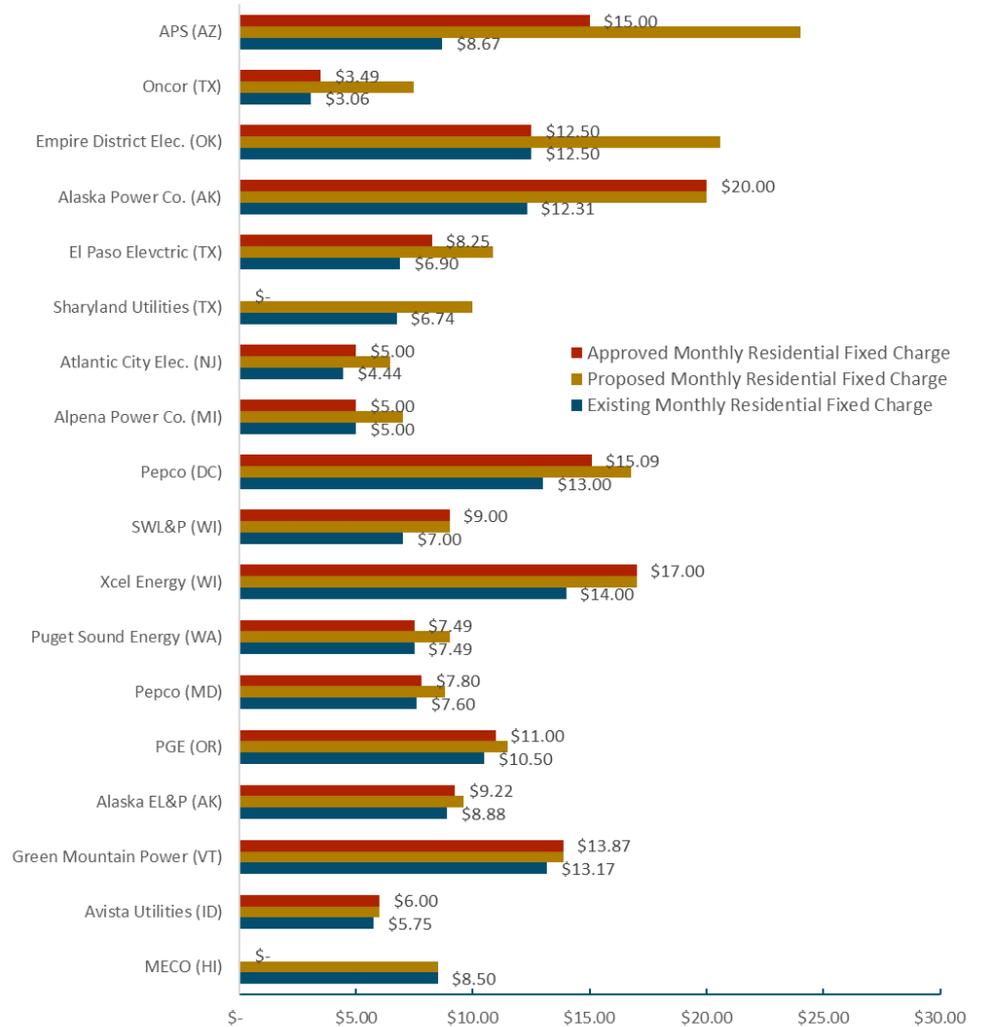


# 2H-2017 Residential Fixed Charge Increase

2H-2017 Percentage Increase in Residential Fixed Charge



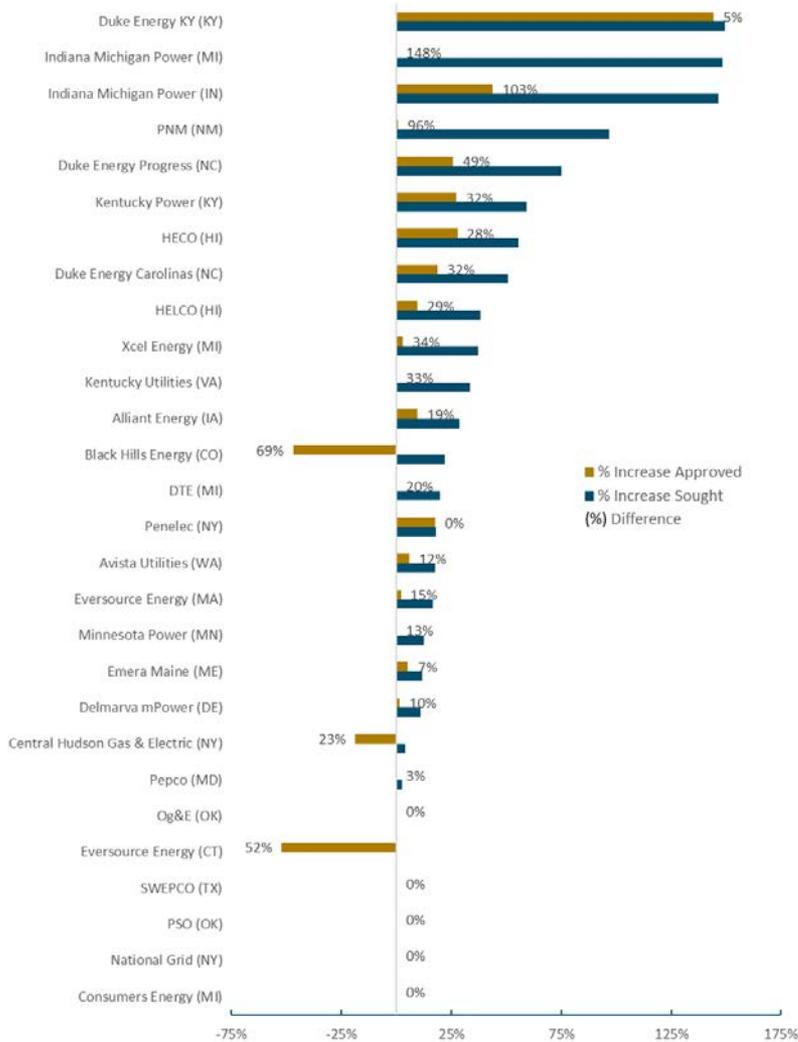
2H-2017 Residential Fixed Charge Increases



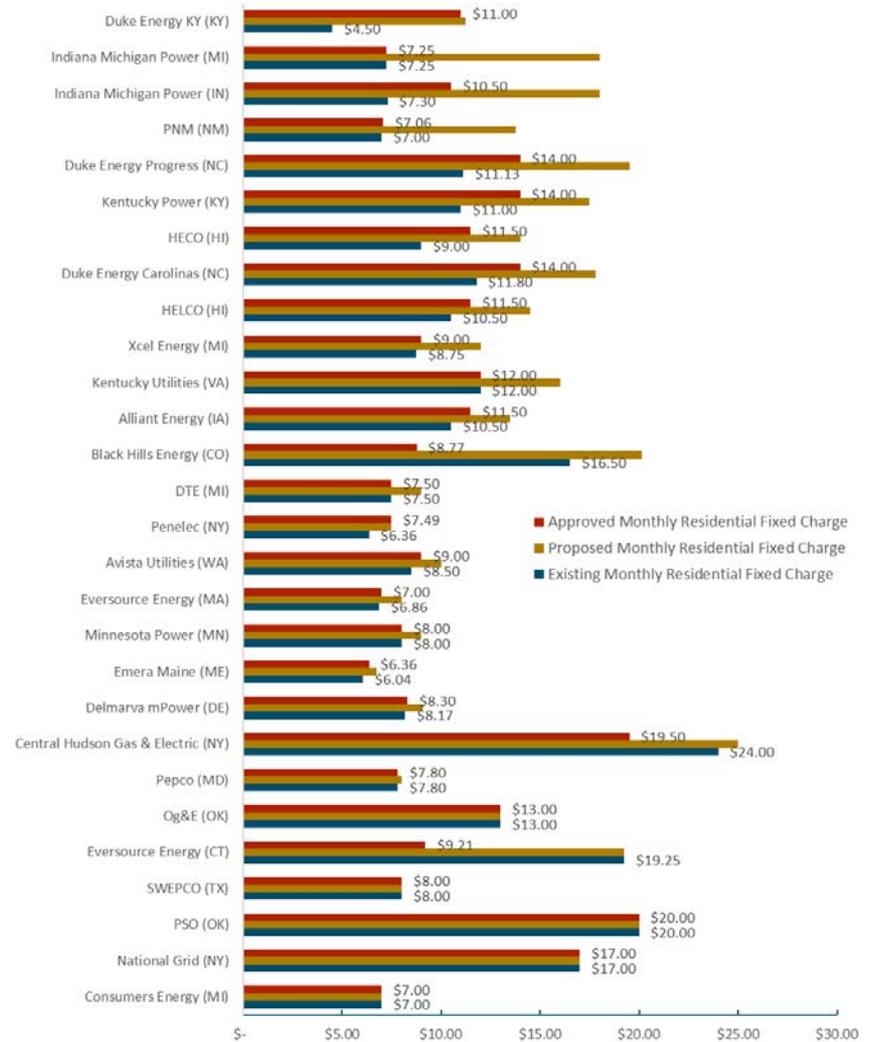


# 1H-2018 Residential Fixed Charge Increase

1H-2018 Percentage Increase in Residential Fixed Charge



1H-2018 Residential Fixed Charge Increases





# 2017/18 Trends

- + Percentage increases approved in 2017 range from 3% (20¢) to 73% (\$6)
  
- + Percentage increases approved in 2018 range from -52% (-\$10) to 144% (\$6.50)
  
- + Several significant decreases:
  - Black Hills Energy: 47% (\$8) *decrease* [vs. proposed increase of 22% (\$3.60)]
  - Eversource Energy CT: 52% (\$10) *decrease* [vs. no proposed increase]



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# ADDITIONAL CASE STUDY: COLORADO STAKEHOLDER AGREEMENT



# Colorado settlement showed successful collaboration with diverse stakeholders

- + **2016 settlement covering rate design & NEM, community solar & green tariffs, and IOU renewable programs capacities**
  - Consolidated issues across several distinct PSC proceedings to cover “full spectrum”
- + **Rate Design & NEM**
  - Xcel initially proposed “grid-use” fee in GRC to cover fixed distribution costs (paired with lower volumetric rate / lower NEM credit); pushback from solar & consumer groups
  - Settlement instead established a voluntary TOU trial for residential customers & a time differentiated rate (TDR) demand charge pilot for residential and commercial customers
    - Expectation of default TOU rates in future (~2020)
  - Key compromise: agreement of solar bloc not to oppose separate decoupling proceeding
- + **Community Solar, Green Tariffs & Renewable Program Capacities**
  - 50 MW utility-owned solar installation proposed, sold via retail subscriptions to green rider
  - Developer concern over competition from Xcel; IOU perceived as having unfair advantage
  - Added 225 MW of solar to green rider program, and 105 MW of community solar
  - Key compromise: amendment prohibiting sale of subscriptions to residential customers (the main market for CS developers)



## + What made the Colorado settlement successful?

- **Comprehensive** – considered multiple issues across several proceedings
- **Compromise** – each group committed to several concessions in order to finalize deal
- **Communication & collaboration** – established ongoing quarterly stakeholder meetings



# Sources & Useful Links

- + [NCCETC 50 States of Solar Q1 2018 Quarterly Report - Executive Summary](#)
- + [NCCETC 50 States of Solar Q4 2017 Quarterly Report & 2017 Annual Review – Executive Summary](#)
- + [SRNL South Carolina Solar Development - Tracking the Effects of Act 236 \(2014- 2017\)](#)
- + [SC State Energy Plan](#)
- + [2015 E3 Cost Shift Analysis](#)
- + [2017 Distributed Energy Resource and Net Metering Implementation – ORS Report](#)
- + [2016 Distributed Energy Resource and Net Metering Implementation – ORS Report](#)