
Renewables Portfolio Standards: An Opportunity for Expanding State Solar Markets

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State Solar Policy Initiatives:

Recent Developments and Lessons Learned

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Presentation Overview

1. Overview of State RPS Policies
2. Supporting Solar within State RPS Policies
3. Experience So Far, and Projected Impacts
4. Major Design Issues of Note
5. Conclusions

Focus is on solar photovoltaics and solar thermal electric, and not solar hot water, solar heating/cooling, day-lighting, etc.

What Is a Renewables Portfolio Standard?

Renewables Portfolio Standard (RPS):

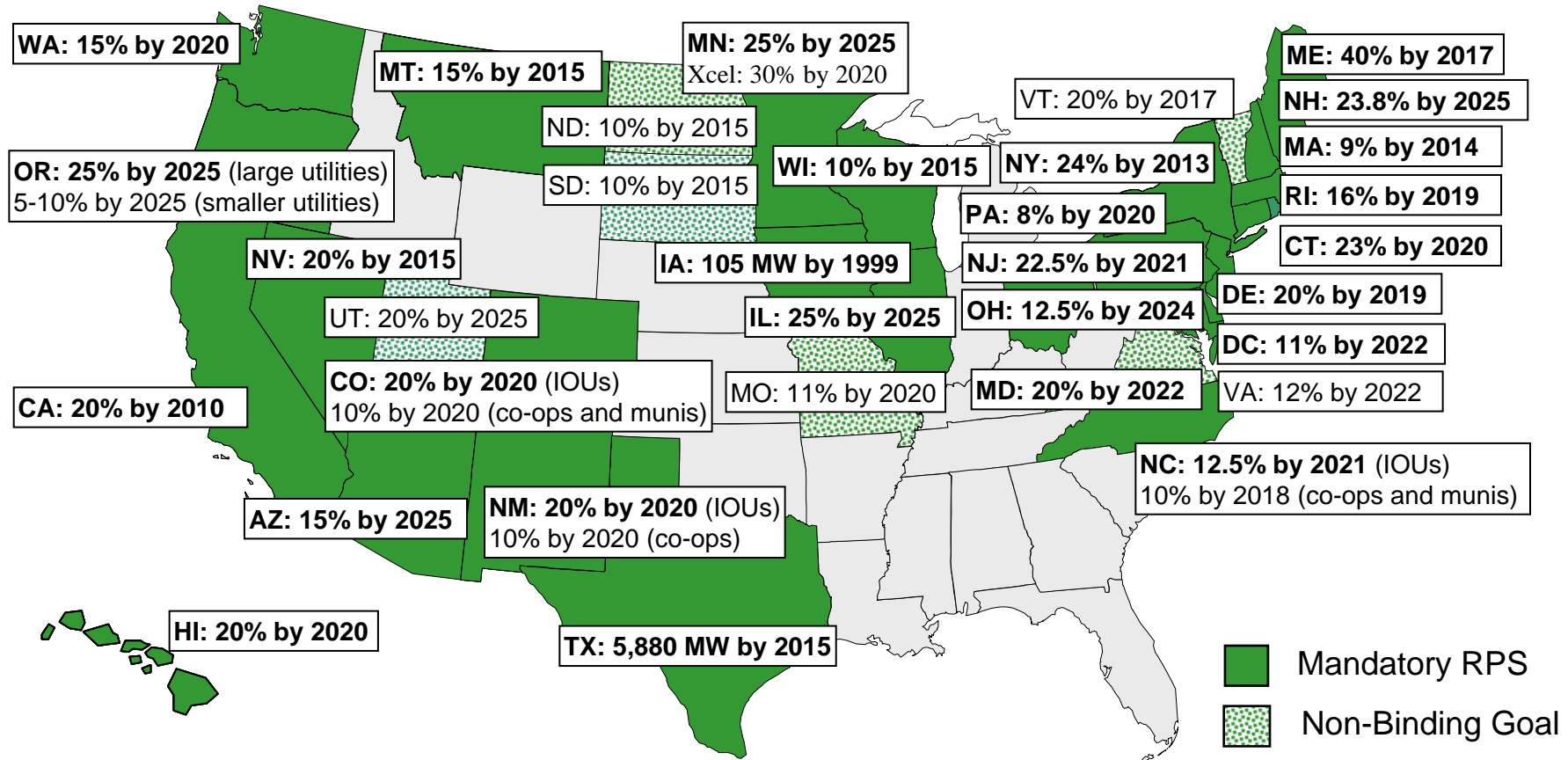
- A requirement on retail electric suppliers...
- to supply a minimum percentage or amount of their retail load...
- with eligible sources of renewable energy.

Typically backed with penalties of some form

Often accompanied by a tradable renewable energy certificate (REC) program, to facilitate compliance

Never designed the same in any two states

State RPS Policies Exist in 26 States and D.C.; 6 States Have Non-Binding Goals



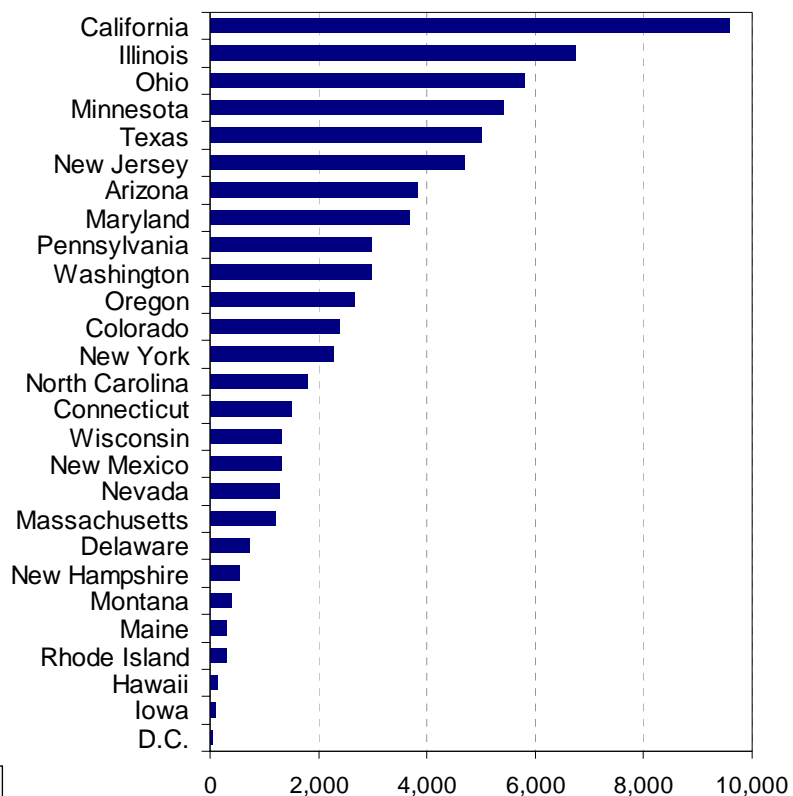
Source: Berkeley Lab

Most policies established through state legislation, but some through regulatory action (NY, AZ) or voter-approved initiatives (CO, WA)

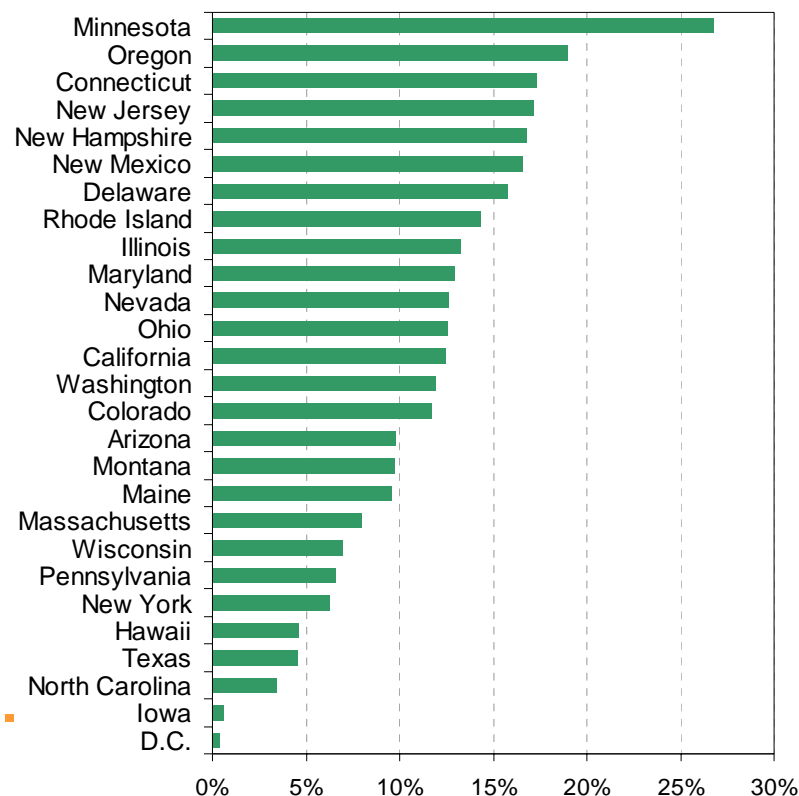
Future Impacts of Existing State RPS Policies Are Projected To Be Relatively Sizable

- Roughly 69 GW of new renewables capacity by 2025, if full compliance is achieved (increases to 86 GW if non-binding renewable targets are included)
- The 69 GW would represent ~5.4% of total projected generation in 2025
- 17% of projected load growth from 1999-2025 met by this new generation

**New Renewable Capacity Needed by 2025
(Nameplate MW)**

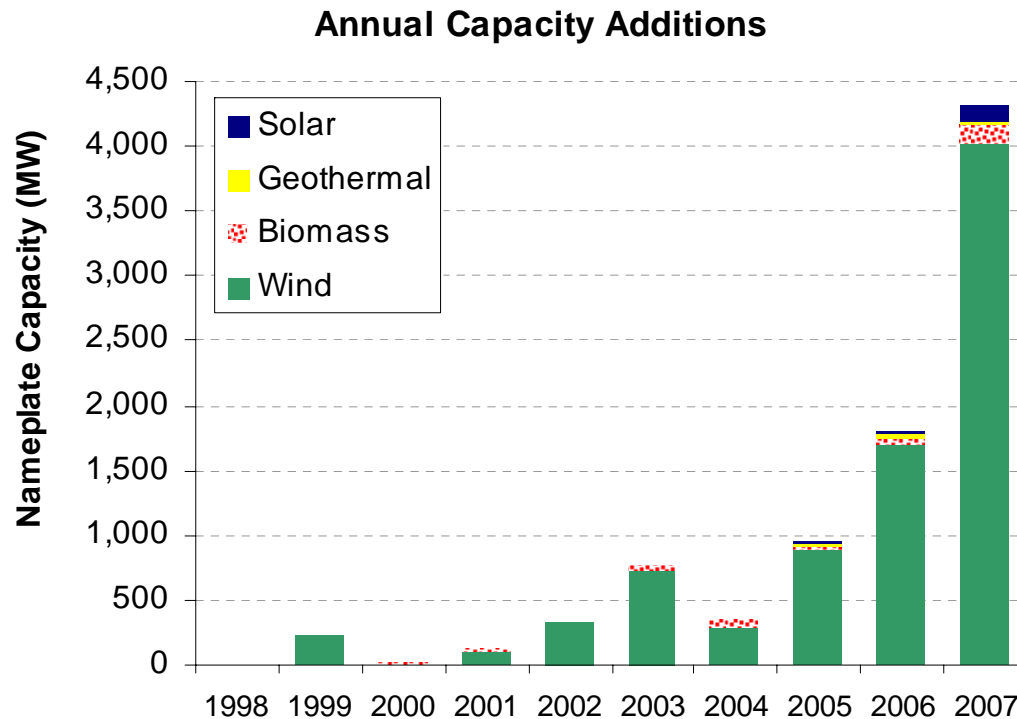


**New Renewable Generation Needed by 2025 as a
Percent of Projected Statewide Retail Sales**

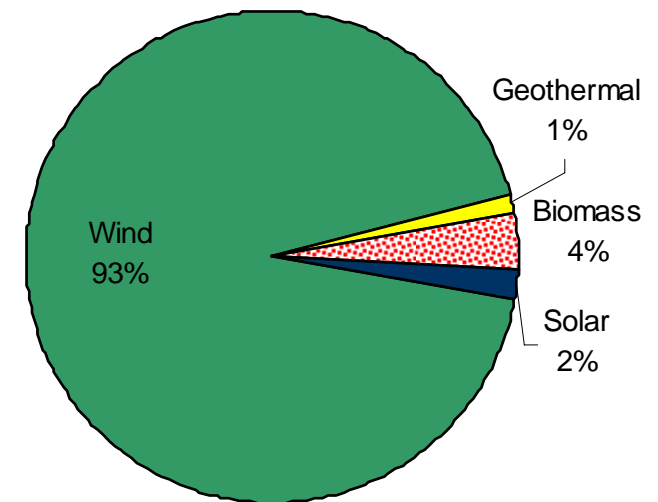


But... Solar Has Not Been a Major Contributor to RPS Compliance So Far

Non-Hydro Renewable Energy Capacity Additions in RPS States



Total Capacity Additions (1998-2007)



The Problem for Solar Electricity Under Traditional RPS Policies

- Traditional RPS, whereby all eligible resources compete, can be effective in supporting least-cost projects
- But is not likely to provide adequate support for emerging technologies, and smaller projects:
 - Cost and solicitation barriers
- 12 of 27 RPS policies provide no differential support for solar/distributed energy; experience shows that:
 - ➔ These policies are unlikely to provide meaningful support to customer-sited PV in the near term
 - ➔ With the exception of the Southwest, these policies are unlikely to greatly benefit solar thermal electricity

More Generally, For Solar to Succeed in an RPS, the Following Must Be Considered

- **Eligibility**

- Are all forms of solar electricity eligible?
- Are customer-sited generators eligible?

- **Measurement**

- Are metering systems or estimation protocols in place?
- Do mechanisms exist to trade small quantities of RECs?

- **REC Ownership**

- Do owners of solar systems “own” their RECs?

- **Differential Support for Solar**

- Does the RPS contain a solar share or credit-multiplier?
- How are these mechanisms implemented?

States that Provide Differential Support for Solar within an RPS Do So in Two Ways

Set-Aside/Solar Share

- A requirement that some portion of the RPS come from solar specifically, or DG more broadly

Solar Multiplier

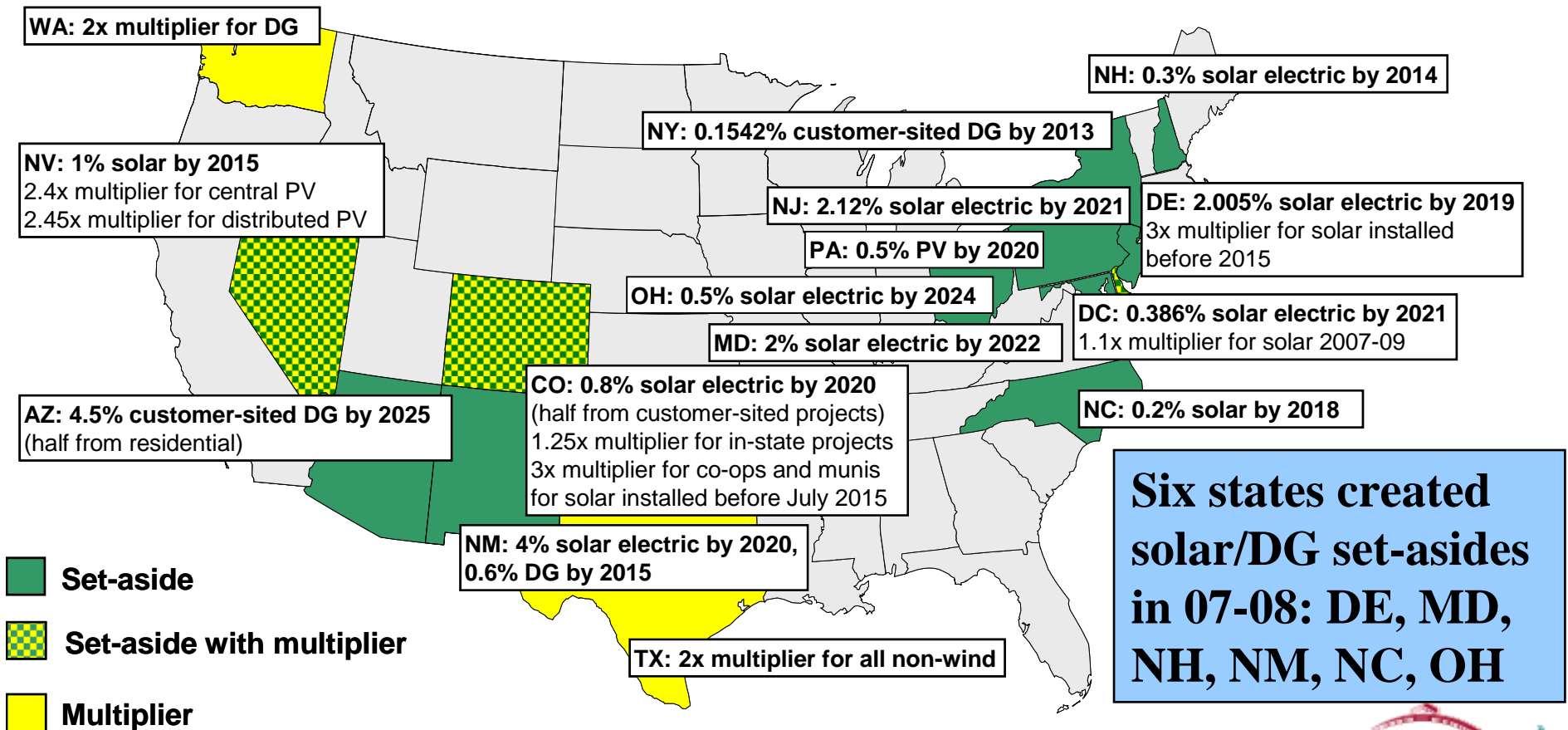
- Provides solar electricity more credit than other forms of generation towards meeting the RPS

Recent move towards set-asides (away from multipliers) due to greater success with these instruments

State governments may also use direct financial incentives to encourage solar power either separate from an RPS (e.g., CA) or to support an RPS (e.g., NJ, NY)

Solar-Specific RPS Designs Are Becoming Increasingly Common

12 states + D.C. have solar or DG set-asides, sometimes combined with credit multipliers; 2 other states only have credit multipliers



State RPS Set-Asides Can Be and Are Designed in Multiple Ways

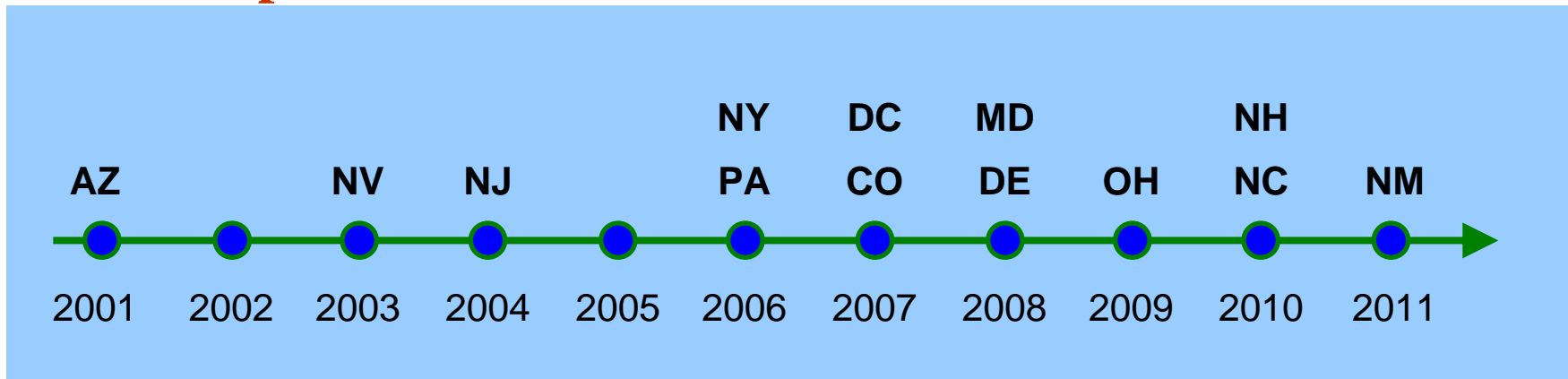
- Percentage targets and timeframes
- Solar-specific or broader DG eligibility
- Solar technology eligibility
 - Photovoltaics
 - Photovoltaics and solar thermal electric
 - Inclusion of solar heating and cooling
- In-state vs. out-of-state eligibility
- Requirements for customer-sited capacity
- Use of multipliers in addition to set-asides
- Cost caps, alternative compliance payments, etc.
- Oversight on contracting and incentives

Development of State RPS Set-Asides: Experience Remains Limited

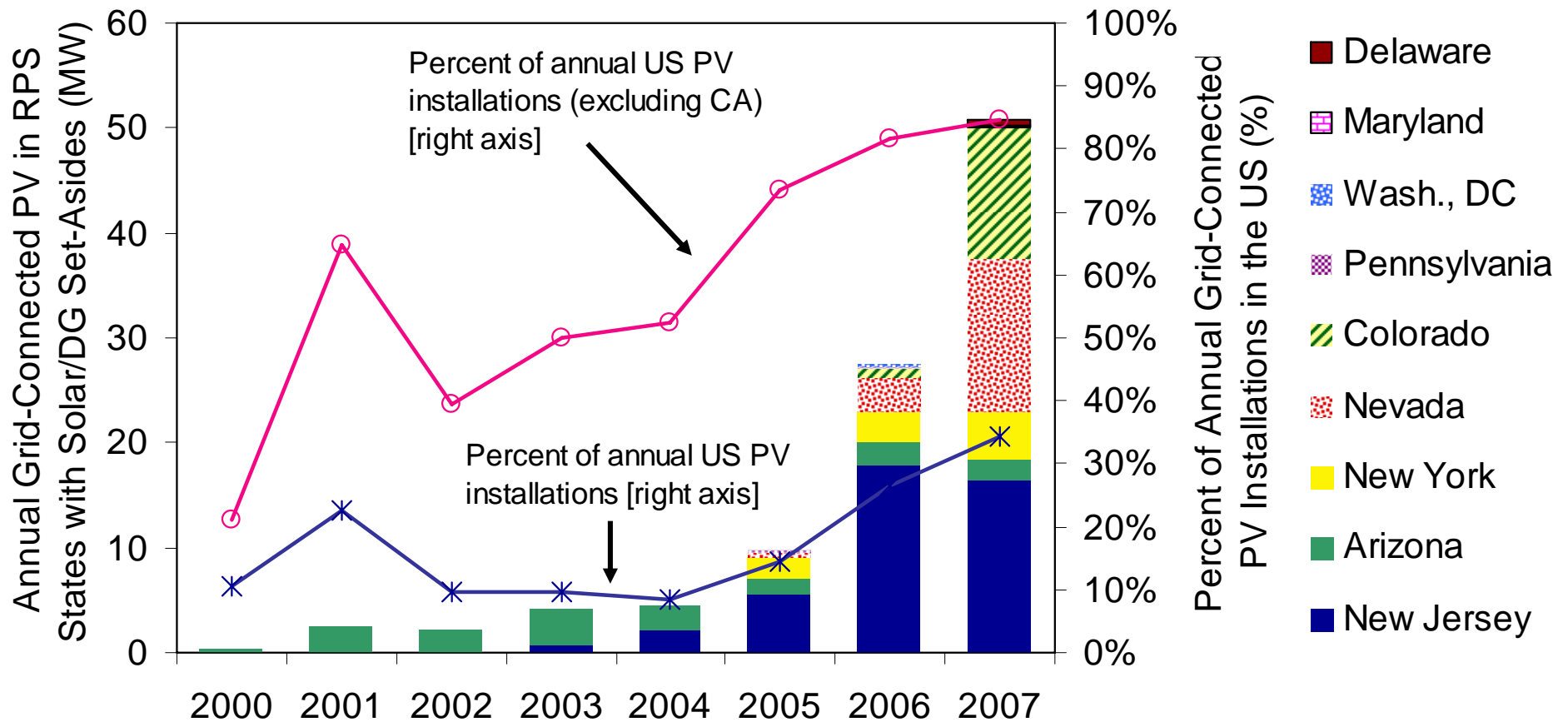
Only three states have had more than three years of experience with a solar/DG set-aside so far:

- Arizona
- Nevada
- New Jersey

First Compliance Year of State RPS Set-Asides



Impact of Solar/DG Set-Asides Is Growing: 102 MW PV from 2000 through 2007



Largest market historically has been NJ, but NV and CO emerged in 2007 as equally sizable; AZ and NY also significant

State RPS Set-Asides Provided the Most-Recent Kick-Start for Solar-Thermal Electric

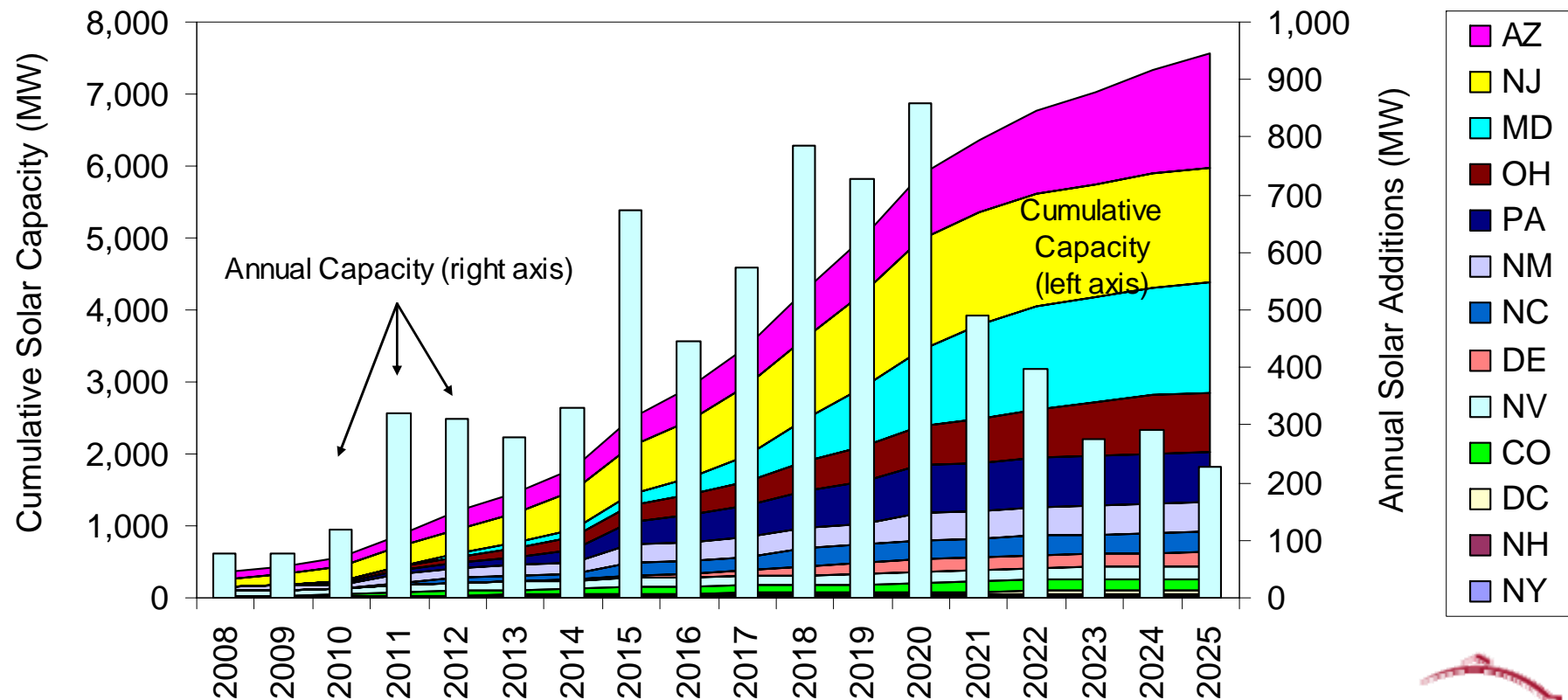
Arizona: 1 MW Saguaro Solar Station came online in 2006; nation's first parabolic trough power plant built since 1990

Nevada: 64 MW Nevada Solar 1 was commissioned in 2007 to help meet the Nevada RPS



Future Impacts Are Projected To Be Substantial, if Full Compliance Is Achieved

- 560 MW required by 2010, growing to 7,550 MW by 2025
- Approximately 100 MW/yr through 2010, 300 MW/yr through 2014, and over 600 MW/yr through 2021



Graphic assumes that full compliance is achieved

And the Leading States Are...

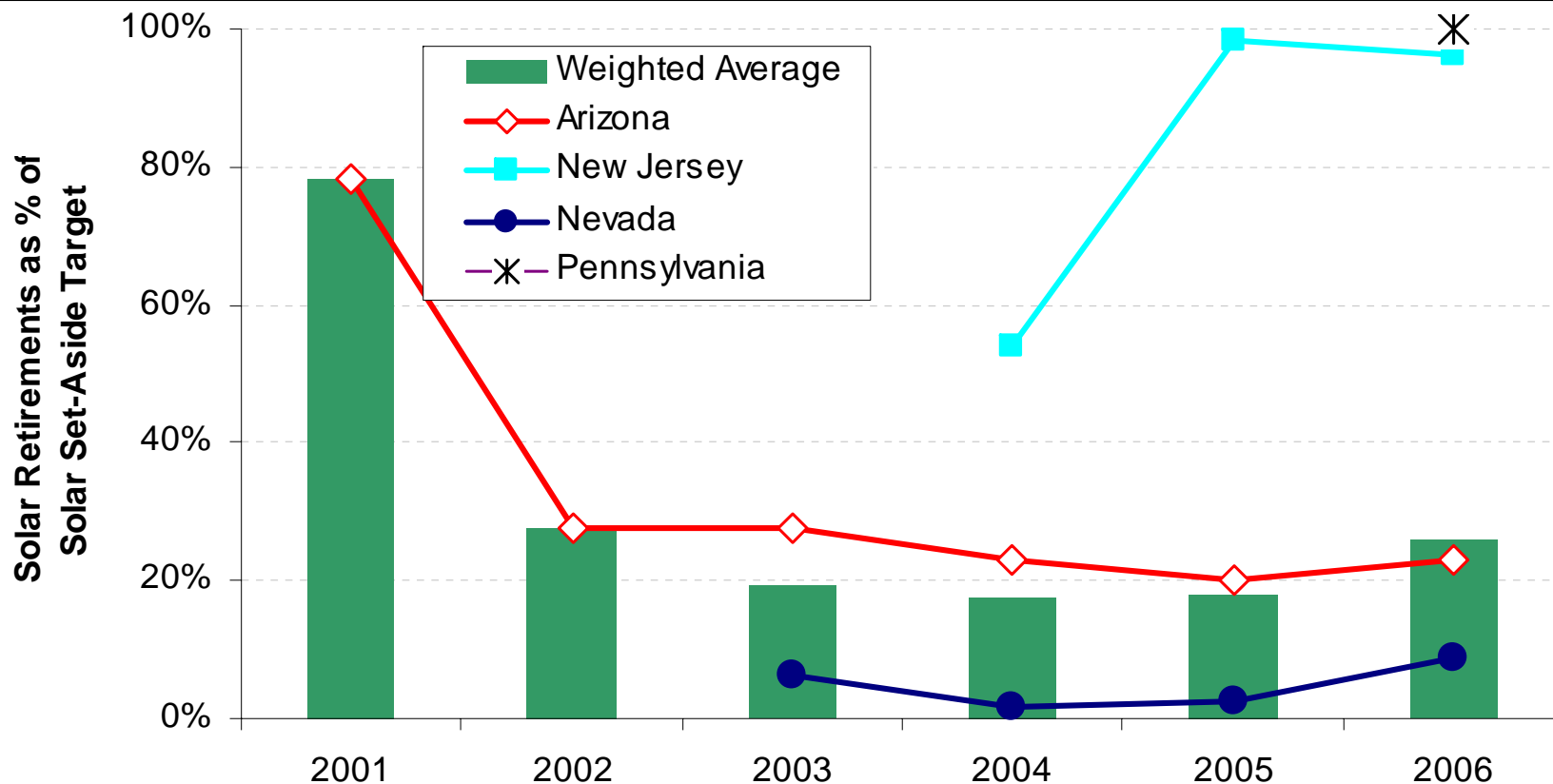
State	2010 Capacity	2025 Capacity	2025 Solar Generation as a % of State Load
Arizona	110 MW	1,600 MW	2.0%
Colorado	29 MW	160 MW	0.4%
Delaware	0.5 MW	190 MW	1.4%
Maryland	14 MW	1,500 MW	2.0%
Nevada	76 MW	180 MW	0.6%
New Hampshire	4 MW	35 MW	0.3%
New Jersey	210 MW	1,600 MW	2.1%
New Mexico	64 MW	420 MW	3.1%
New York	10 MW	15 MW	0.0%
North Carolina	5 MW	280 MW	0.2%
Ohio	14 MW	820 MW	0.5%
Pennsylvania	25 MW	690 MW	0.5%
Washington D.C.	0.5 MW	54 MW	0.4%
Total	560 MW	7,550 MW	n/a

Note: Data are presented in direct-current units, at Standard Test Conditions

- Largest markets driven by these policies in long term include: AZ, NJ, MD, OH, PA
- In near-term, NM, NV, and CO are also significant
- California goal of 3,000 MW equals ~1.5%, lower than NM, NJ, MD, AZ

Beware... States with Set-Asides Are Not Universally Achieving their Solar Targets

Early-year purchase/retirement of solar “RECs”, relative to set-aside requirements, has been mixed



Technical Design Considerations Will Affect the Impact of Set-Asides on Solar Growth

Broader DG set-aside	Competition with other resources makes market size for solar uncertain (AZ, NY)
Credit multipliers	Reduces effective solar % (CO, DC, DE, NV)
Eligibility of solar thermal electric	Affects fate of PV (PA only allow PV; NV provides extra credit to PV)
Eligibility of utility-scale solar	Affects fate of customer-sited installations (AZ, CO, NM, NY all have DG requirements; NV has multiplier)
Qualification for out-of-state solar	Impacts the degree to which solar is installed in-state

Of course, the existence of Federal tax incentives also matters!

Cost Caps, ACP Levels, Funding Limits May Impede Achieving Solar Targets

Alternative Compliance Payments

- NH (\$150/MWh), DE (\$250-\$350/MWh), DC (\$300/MWh), MD (\$450/MWh dropping to \$5/MWh), NJ (\$711-\$595/MWh)
- Many of these are **below** what is needed to make solar economic, absent other forms of state funding

Cost Caps

- CO (1.7%), MD (1%), NC (1.9%), NJ (2%), NM (1.8%), OH (3%)
- Several of these could become binding

Funding Limits

- AZ, NY
- AZ limit has been *severely* binding in the past

Possible Force Majeure Events

- NV, PA, others

Contracting and Incentive Policies Are Critical to the Success of a Set-Aside

Reliance on short-term REC purchases to meet solar RPS likely to be costly and ineffective, given political risk; of most concern in states with retail electric competition

- **Long-term REC contracting**
 - Implicit Encouragement: NJ (8 year ACP schedule; investigating securitization)
 - Strict Requirements: MD (>15 yrs), NC (as long as needed by generator), CO (>20 yrs), NV (>10 yrs)
- **Up-front payments for smaller PV systems**
 - CO, NV, AZ, NJ, NY, MD

Conclusions

- Traditional RPS designs will do little to support customer-sited PV in the near term
- State RPS policies that include solar or DG set-asides are becoming more popular, and are increasingly driving solar development
- RPS policies that only have credit multipliers for solar have not yet seen significant solar additions
- Greater focus on design details is needed; many solar set-asides appear likely to need re-design

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