



NC State University

North Carolina **Solar Center**

State Solar Policy: Overview & Trends

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Southeast Solar Summit

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Advancing Renewable Energy for a Sustainable Economy



North Carolina Solar Center

- Operated by College of Engineering at NC State University
- Created in 1988 as a Clearinghouse for RE Information, Training, Technical Assistance and Applied Research
- Sponsored by the NC State Energy Office, Department of Administration
- Other Funding: Industry, Federal Labs, US DOE, USDA, IREC, Foundations, Other State Agencies & NGOs



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NC Solar Center - An Inclusive Interest in EERE

Solar

- Photovoltaics
- Solar hot water
- Passive solar
- Daylighting

Hydrogen & Fuel Cells

Biomass

- Animal waste
- Energy crops
- Landfill gas

Energy Efficiency



AFVs and Fuels

- Ethanol
- Biodiesel
- AFVs

CHP & Distributed Generation

Wind

Green Buildings & Sustainable Design

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Presentation Outline

- **Financial Incentives to Promote Solar**
- **Regulations & Policies to Promote Solar**
- **NC Incentives – A Case Study**



The DSIRE Project

***Database of
State
Incentives for
Renewables &
Efficiency***

www.dsireusa.org





Federal Incentives

- Residential Solar & Fuel Cell Tax Credit
- Business Energy Tax Credit
- Accelerated Depreciation
- USDA Grant, Loan Guarantee & Direct Loan Programs
- Programs for Non-taxable Entities

*Federal Incentives*

Residential Tax Credit

- **Eligible Technologies:** Solar Water Heating, PV, Fuel Cells (NOT solar pool heating)
- **Amount:** **30%**
- **Maximum Credit:** \$2,000 for solar; \$500 per 0.5 kW for fuel cells
- **Carryover Provisions:** Excess credit may be carried forward to succeeding tax year.
- **Equipment/ Requirements:** Solar water heaters must be SRCC certified. At least half the energy used to heat the dwelling's water must be from solar.
- **Effective:** Systems placed in service 1/1/2006 -- 12/31/2008

*Federal Incentives*

Business Energy Tax Credit

- **Eligible Technologies**
 - Solar energy to generate electricity, to heat or cool (or provide hot water for use in) a structure, or to provide solar process heat. Does NOT apply to pool heating.
 - Also includes geothermal, fuel cells, microturbines, & solar hybrid lighting.
- **Amount:** 30%
- **Maximum Credit:** \$500 per 0.5 kW for fuel cells; \$200 per kW for microturbines; no maximum specified for other technologies
- **Carryover Provisions:** Excess credit may be carried forward to succeeding tax year.
- **Equipment/ Requirements:** Solar water heaters must be SRCC certified. At least half the energy used to heat the dwelling's water must be from solar.
- **Effective:** Systems placed in service 1/1/2006 -- 12/31/2008

*Federal Incentives*

Accelerated Depreciation

- Businesses recover investments in assets through depreciation deductions taken over a specified number of years depending on the type of property
- Applies to technologies eligible for the BETC, plus wind. Solar thermal, solar electric, geothermal electric, wind, [and beginning in 2006 - fuel cells, microturbines, solar hybrid lighting]
- “Class life” of 5 years
 - Year 1: 20%
 - Year 2: 32%
 - Year 3: 19.2%
 - Year 4: 11.52%
 - Year 5: 11.52%
 - Year 6: 5.76%



State & Federal Tax Incentives for Commercial Solar Installations

- Note that the basis for calculating depreciation deductions is reduced by only half of the value of the federal tax credit.
- For example, if a business makes an \$80,000 investment and claims a 30% federal tax credit of \$24,000, the basis is reduced by \$12,000, not the entire \$24,000 value of the tax credit. Therefore, the depreciation basis would be \$68,000. The chart below illustrates the resulting annual federal tax deductions for the investment – totaling \$23,120 -- assuming a tax rate of 34%

Federal Depreciation Deductions (\$68,000 basis)

Depreciation rate for 5-year recovery period:	Amount	Depreciation Deduction*
Year 1: 20%	\$13,600	\$4,624
Year 2: 32%	\$21,760	\$7,398
Year 3: 19.2%	\$13,056	\$4,439
Year 4: 11.52%	\$7,834	\$2,663
Year 5: 11.52%	\$7,834	\$2,663
Year 6: 5.76%	\$3,917	\$1,332
Total	\$68,000	\$23,120

* based on 34% federal tax rate



Commercial Example #1

10-kW Commercial PV System

Eligible expenditures	\$80,000
NC State Tax Credit	(\$28,000)
Federal Tax Credit	(\$24,000)
Taxes on State Credit*	\$9,520
State & Federal Depreciation Deductions**	(\$20,649)
<hr/> Net Cost	<hr/> \$16,871

* based on 34% federal tax rate

** net present value

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*Federal Incentives*

USDA Renewable Energy Systems & Energy Efficiency Improvements Guaranteed Loans & Direct Loan Program

- **Eligible Renewable/Other Technologies:** Solar Water Heat, Solar Space Heat, Photovoltaics, Wind, Biomass, Geothermal Electric, Geothermal Heat Pumps, Hydrogen, Direct-Use Geothermal, Anaerobic Digestion, Renewable Fuels, Fuel Cells using Renewable Fuels
- **Applicable Sectors:** Commercial, Agricultural
- **Amount:** Grants: 25% of eligible project costs; Guaranteed loans: 50% of eligible project costs
- **Maximum:** Grants: \$500,000 per renewable-energy project; Guaranteed loans: \$10 million
- For FY 2007 there was approximately \$11.4 million in funding for competitive grants and \$176.5 million in authority for guaranteed loans.



Federal Incentives for Non-Taxable Entities

- **Clean Renewable Energy Bonds (CREBs)**
 - financing mechanism for public sector renewable energy projects
 - issued with a 0% interest rate, the borrower pays back only the principal of the bond, and the bondholder receives federal tax credits in lieu of the traditional bond interest
- **Renewable Energy Production Incentive**
 - provides financial incentive payments for electricity produced and sold by new qualifying renewable energy generation facilities
 - Appropriations dependent



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State Financial Incentives for Solar

- Direct Incentives
 - Rebates (17)
 - Grants (14 + DC)
 - Production Incentives (3)
- Tax Credits/Deductions/Exemptions (22)
- Low-Interest Loans (20)
- Sales Tax Exemptions (15)
- Property Tax Incentives (26)
- Industry Recruitment Incentives (9)

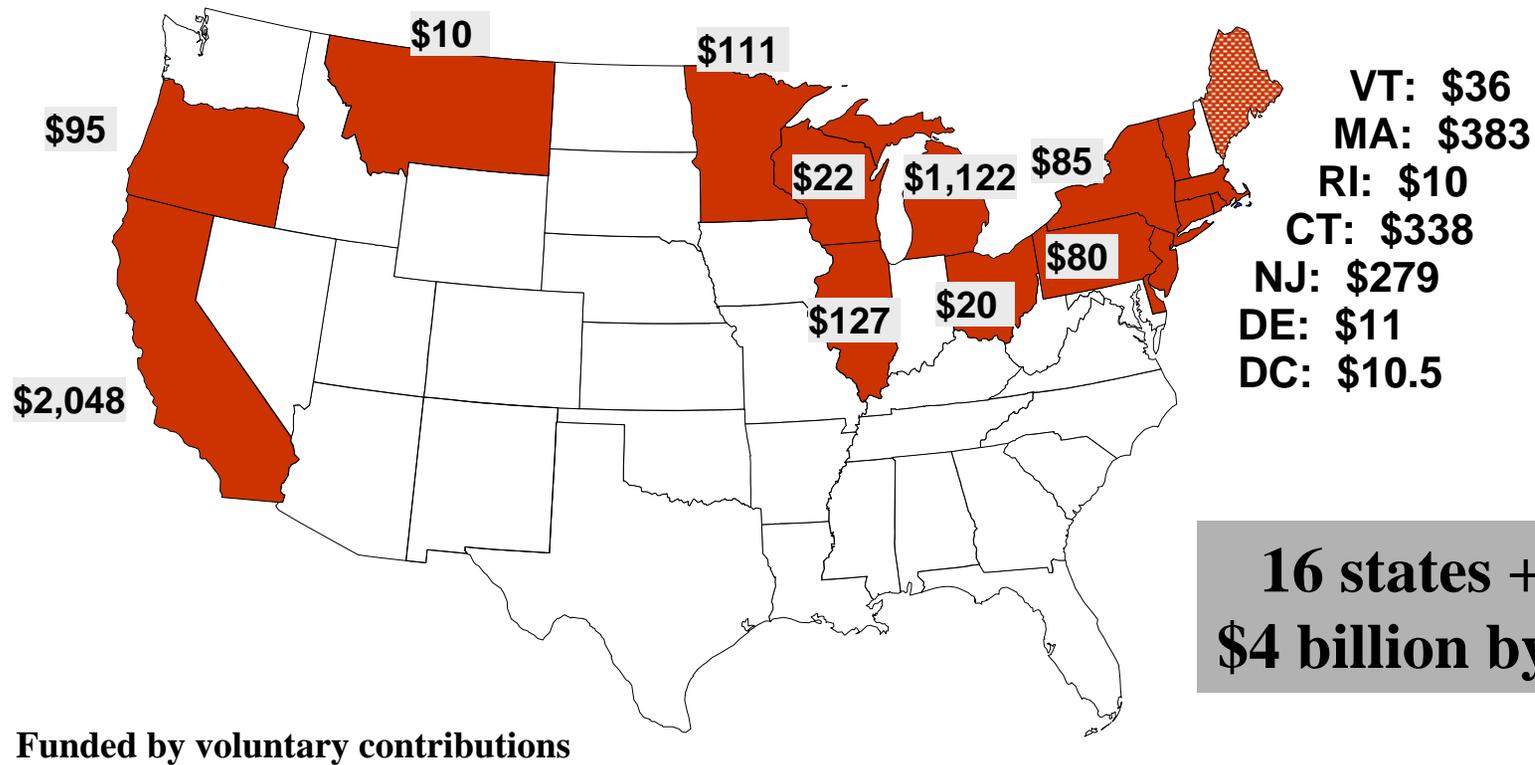


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Public Benefit Funds for Renewables

Cumulative, 1998-2017 (millions of \$)



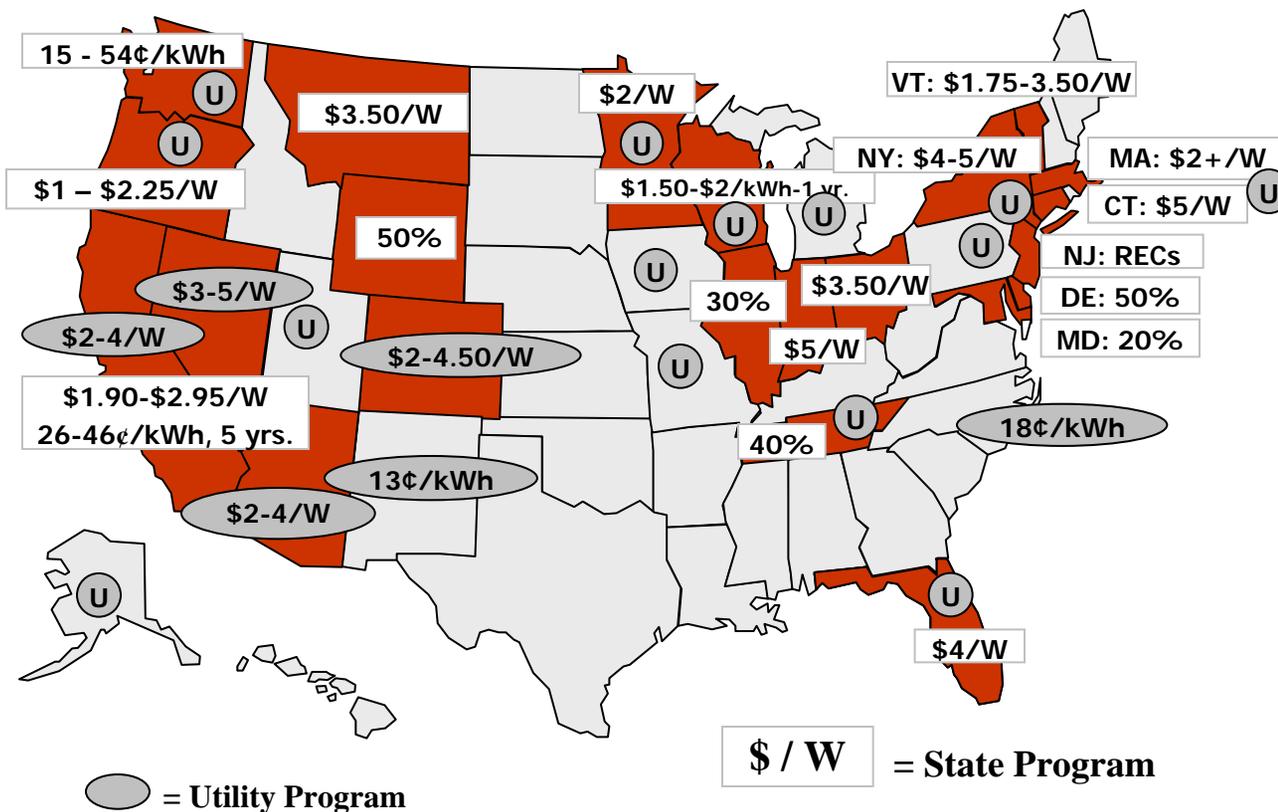
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Direct Incentives for Solar PV



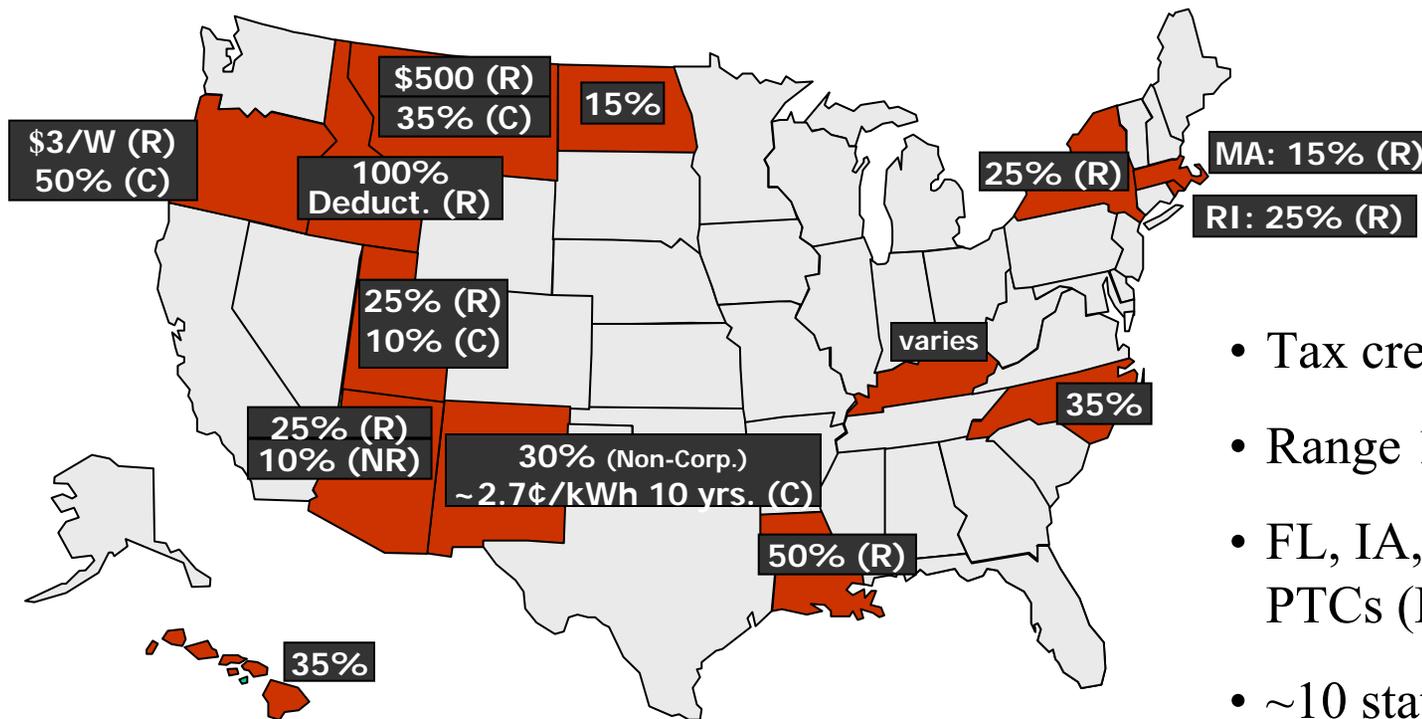
- 22 “state” programs (includes CO, NV, AZ - RPS-inspired utility programs)
- NJ, CA, NY transitions
- ~ 55 utilities/nonprofits in 20 states



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Solar PV Tax Credits



- Tax credits in 13 states
- Range 10% - 50%
- FL, IA, NE, OK have small PTCs (PV eligible)
- ~10 states proposed new credits in past year

(R) Residential; (C) Commercial; (NR) Non-Residential

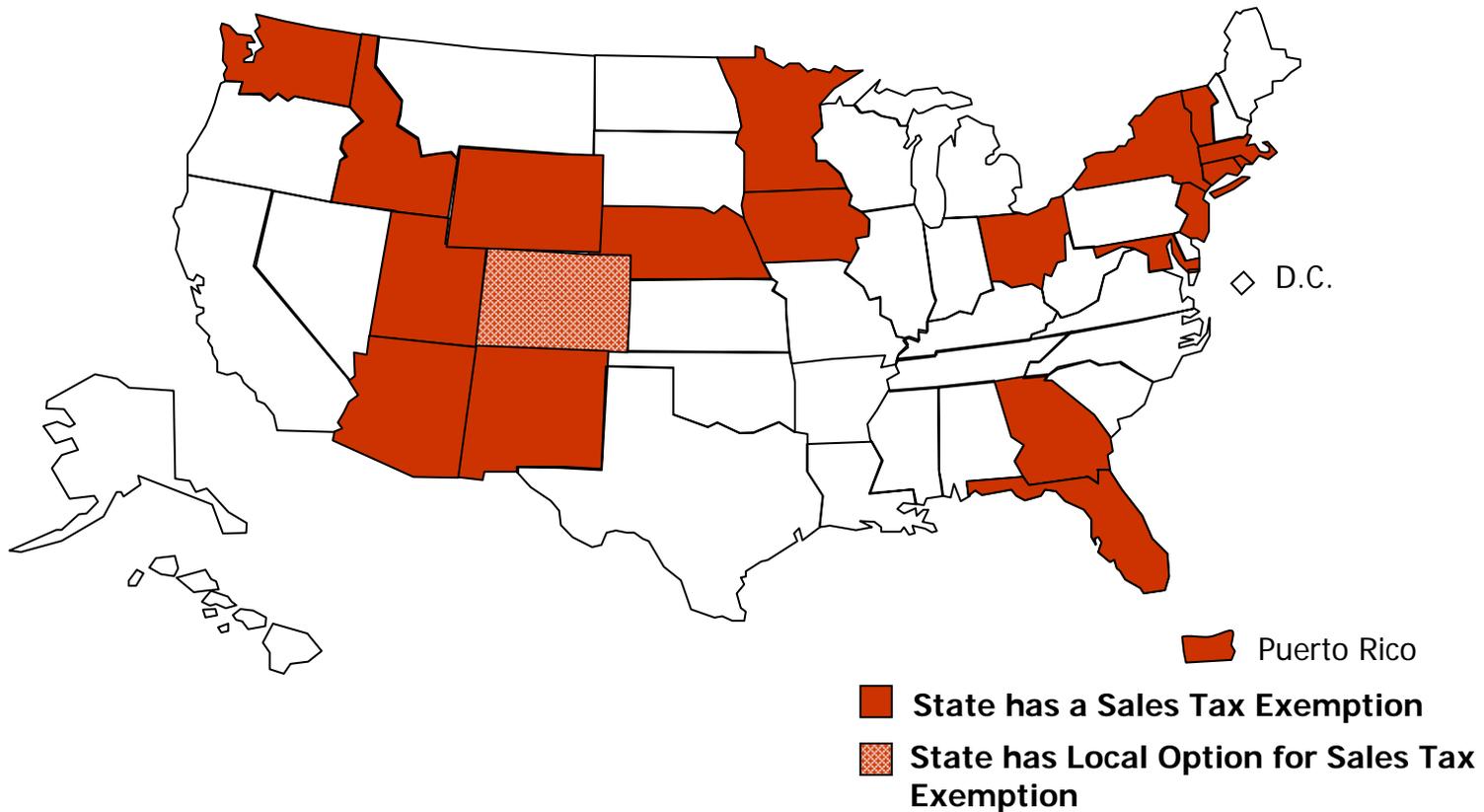


Performance-Based PV Incentives

- State Programs
 - Approaches used by FL, IA, NE, OK
 - CA PBI begins soon as part CSI
 - CT CEF changed from capacity based to expected performance (EPBB)
 - NJ moving toward REC-based mechanism to replace rebates
- Utility PV Incentives
 - PNM - PBI \$0.13/kWh through 2018
 - SRP (AZ) and LADWP - transitioned to expected performance basis
 - SMUD - developing EPBB
 - Xcel Energy, Aquila - EPPB (small systems); PBI (large systems)



State Sales Tax Exemptions for Renewables



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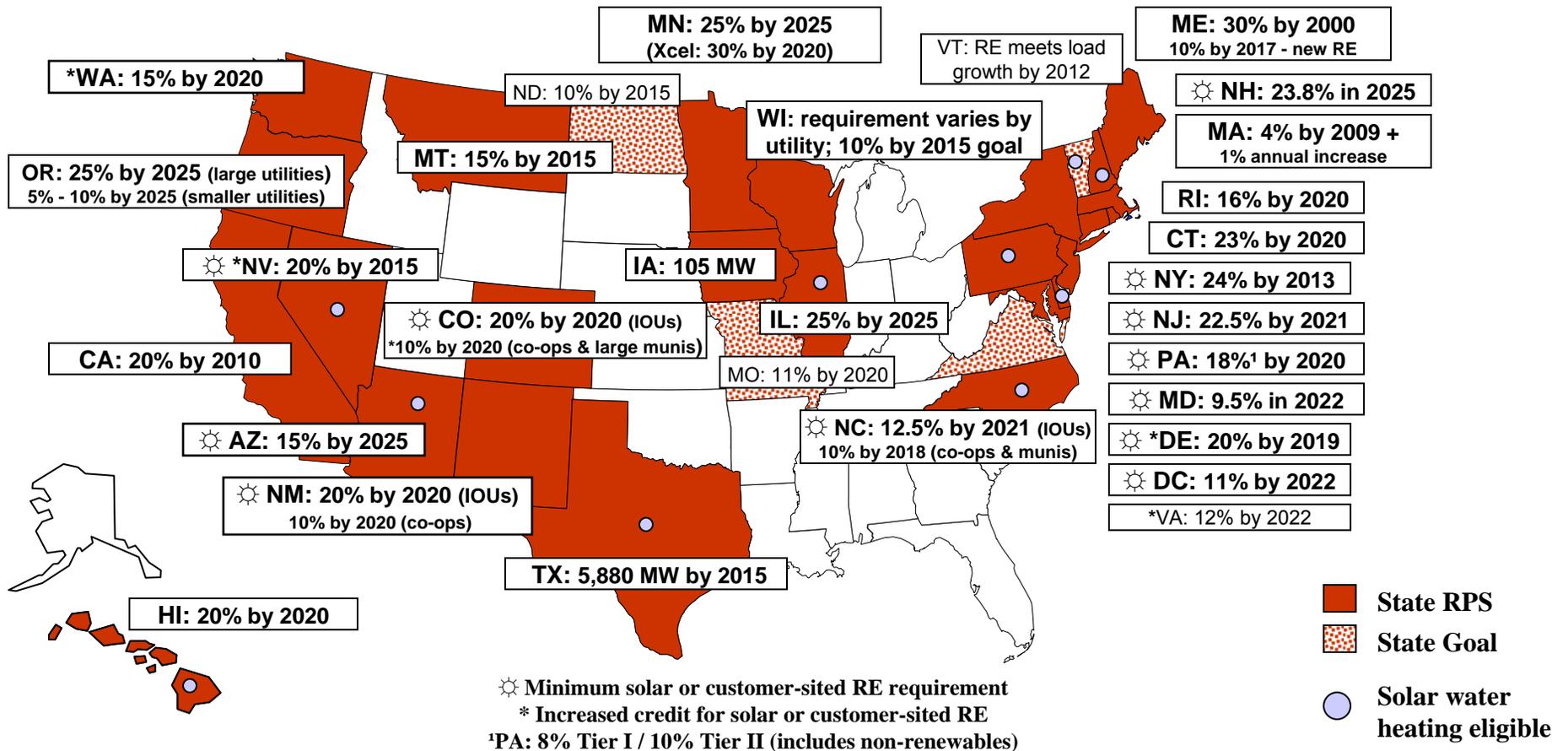


State Regulations & Policies

- Renewable Portfolio Standards/Goals (29)
- Public Benefits Fund (16 + DC)
- Net Metering (38)
- Interconnection Standards (20)
- Solar Access Laws (34)
- Green Power Purchasing Policies (11)
- Fuel Source & Emissions Disclosure (24 + DC)
- Contractor Licensing (9)
- Equipment Certification (6)



Renewables Portfolio Standards & Goals

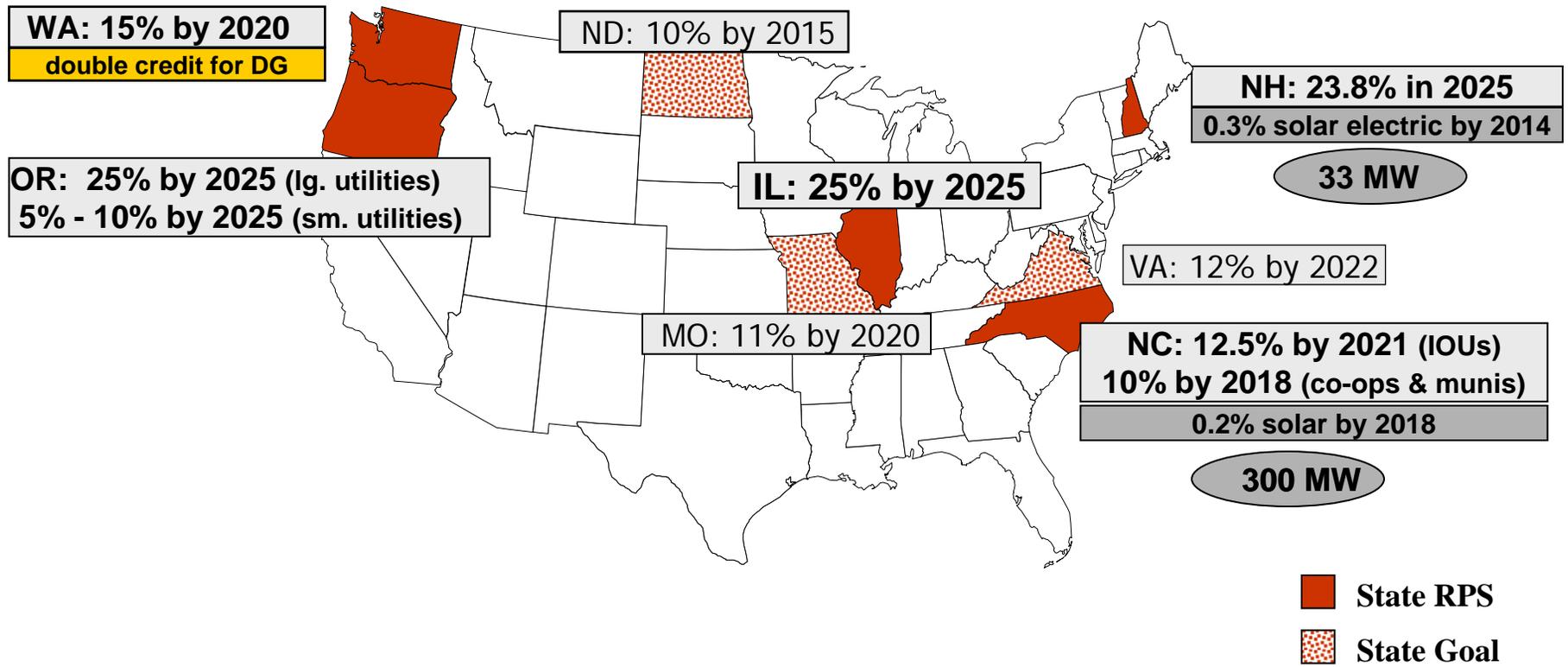




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New RPS Policies & Goals *(Since fall 2006)*



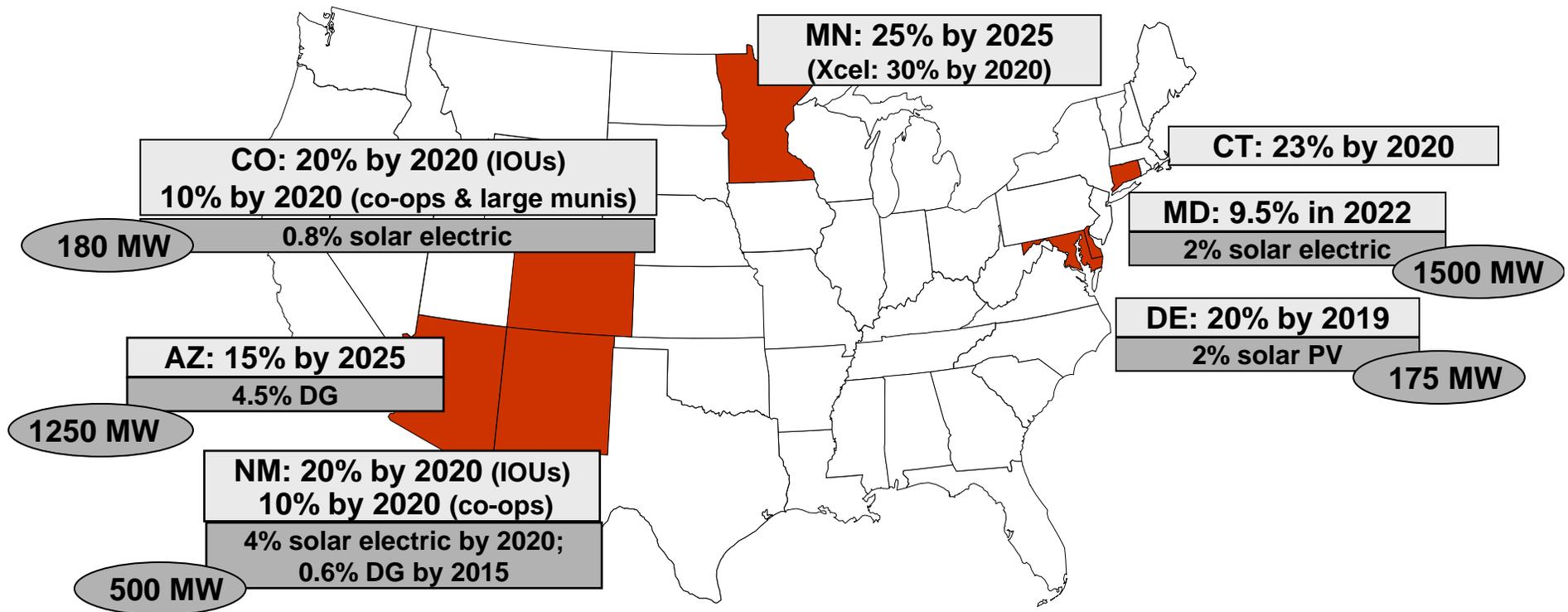
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Increased/Expanded RPS Policies (Since fall 2006)



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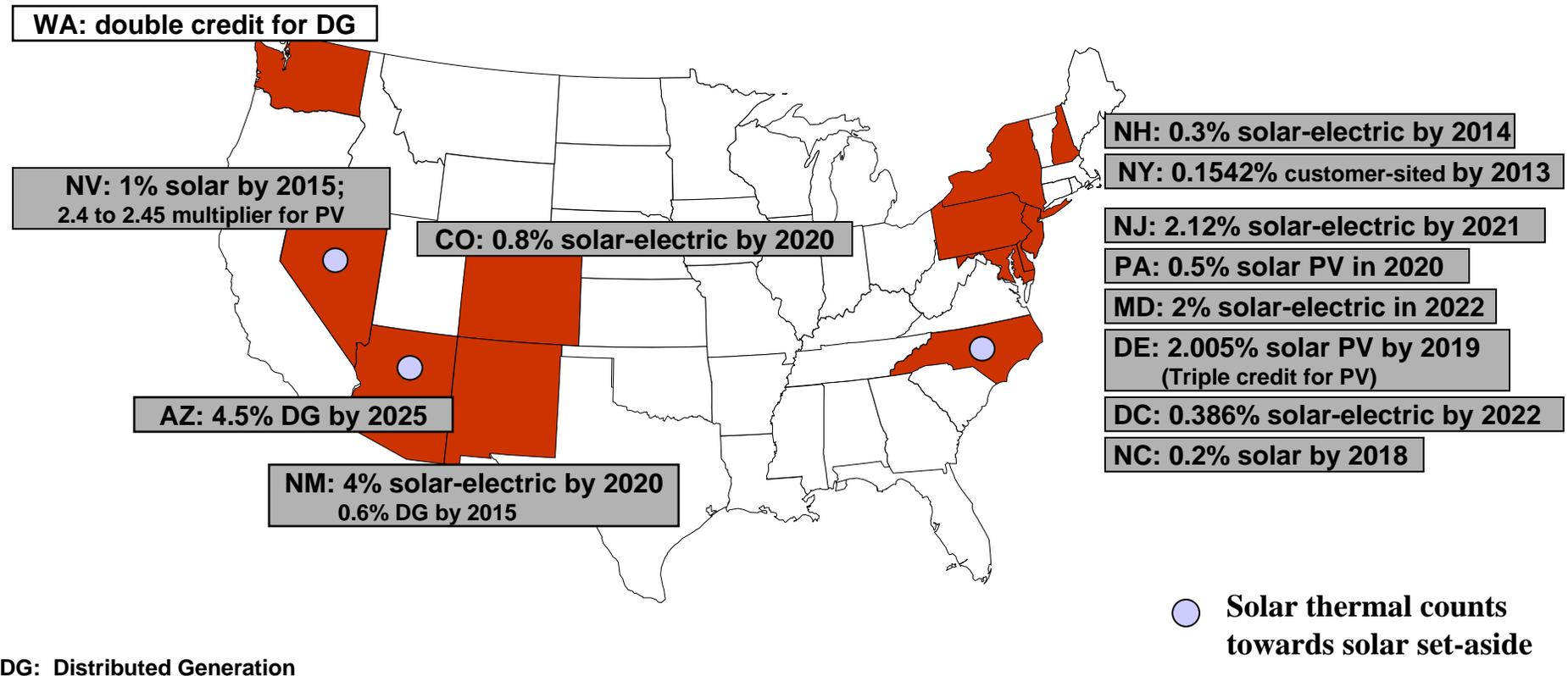


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Solar/DG Provisions in RPS Policies

(~6,000 MW solar capacity)





Solar Capacity Resulting from RPS Solar Policies

2005 Outlook ~ 1,000 MW

2006 Outlook ~ 2,700 MW

2007 Outlook ~ 6,000 MW

Largest markets:

- NJ (1500 MW)
- MD (1500 MW)
- AZ (1000-1500 MW)
- PA (850 MW)



Interconnection Standards

Interconnection standards are adopted to govern how DG systems are connected to the electric grid.

Technical issues include safety, power quality, system impacts. Most technical issues have been resolved.

Policy issues include legal and procedural considerations. State approaches vary widely. Best practices adopted by NJ, OR, CO.



Interconnection: Best Practices

- Individual system capacity limit ≥ 10 MW
- All utilities participate; all customers eligible
- Multiple levels of review (3 or 4)
- Transparent screens, study reviews, timelines
- Minimal application fees; no additional fees, charges
- Standard form agreement, application
- No additional insurance requirements
- IEEE 1547
- Network interconnection permitted
- No external disconnect switch
- Customer retains RECs





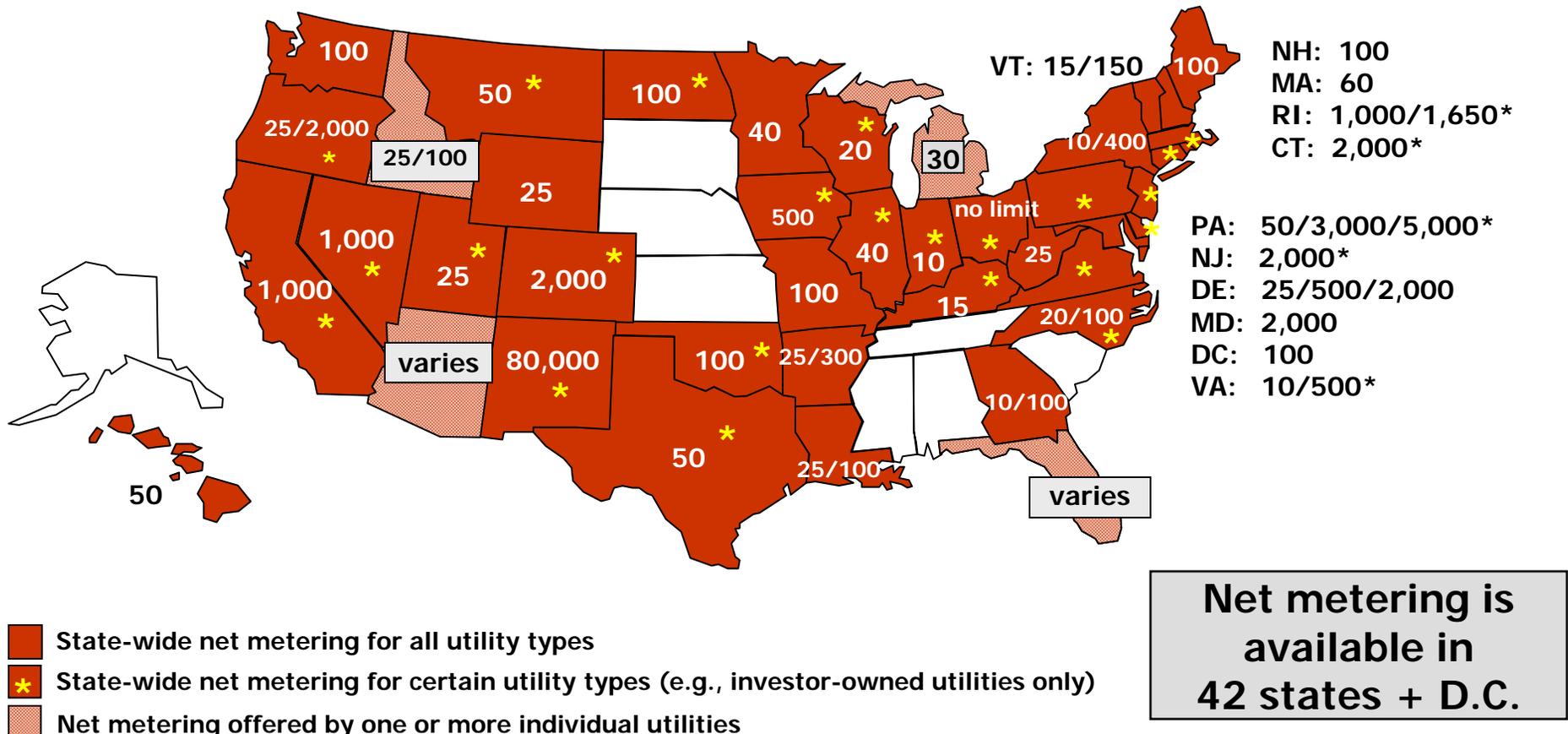
Net Metering

Net metering allows customers to generate their own electricity and store any excess electricity, usually in the form of a kWh credit, on the grid for later use.

Net metering available “statewide” in 38 states. State policies vary dramatically. Best practices adopted by CO, NJ, PA, MD, CA.



Net Metering

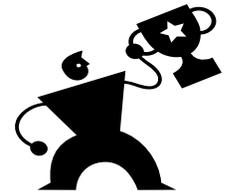


- NH: 100
- MA: 60
- RI: 1,000/1,650*
- CT: 2,000*
- PA: 50/3,000/5,000*
- NJ: 2,000*
- DE: 25/500/2,000
- MD: 2,000
- DC: 100
- VA: 10/500*



Net Metering: Best Practices

- Maximum system capacity ≥ 2 MW
- All renewables eligible (+ CHP)
- All utilities must participate
- All customer classes eligible
- Limit on aggregate capacity $\geq 5\%$
- Annual reconciliation of NEG, or no expiration
- Interconnection standards
- No application fee
- No special charges, fees or tariff change
- Customer owns RECs





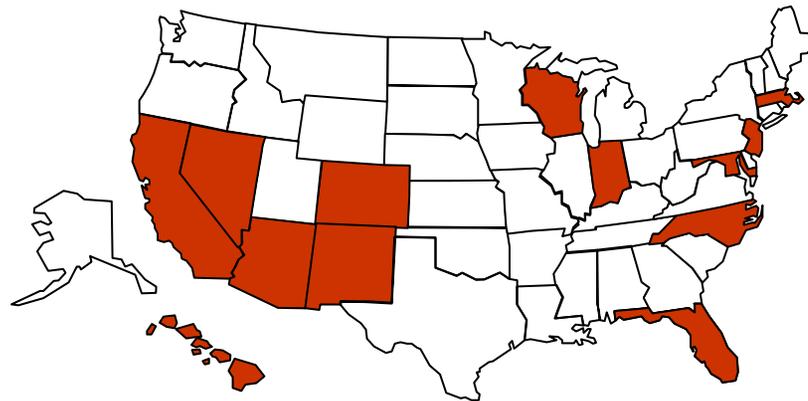
Net Metering: Revised Statutes/Rules (Since fall 2006)

- Individual capacity raised: AR, CT, DE, MD, NH, NM, NV, OR, PA, RI
- Aggregate capacity raised: CT, DE, MD, NH, OR, RI, VA
- More renewables eligible: DE, OR, NH, OH, VA
- NEG treatment clarified/improved: AR, CT, DE, MD, NH, NV, OH, OR, PA
- REC ownership clarified/improved: AR, CA, DE, MD, NV



Solar Access Laws

- Solar easements allow for the rights to existing solar access on the part of one property owner to be secured from an owner whose property could be developed in such a way as to restrict that resource. Transferred with property title.
- 13 states limit or prohibit restrictions that neighborhood covenants and/or local ordinances can impose on the use of solar equipment.





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NC Renewable Energy Tax Credit

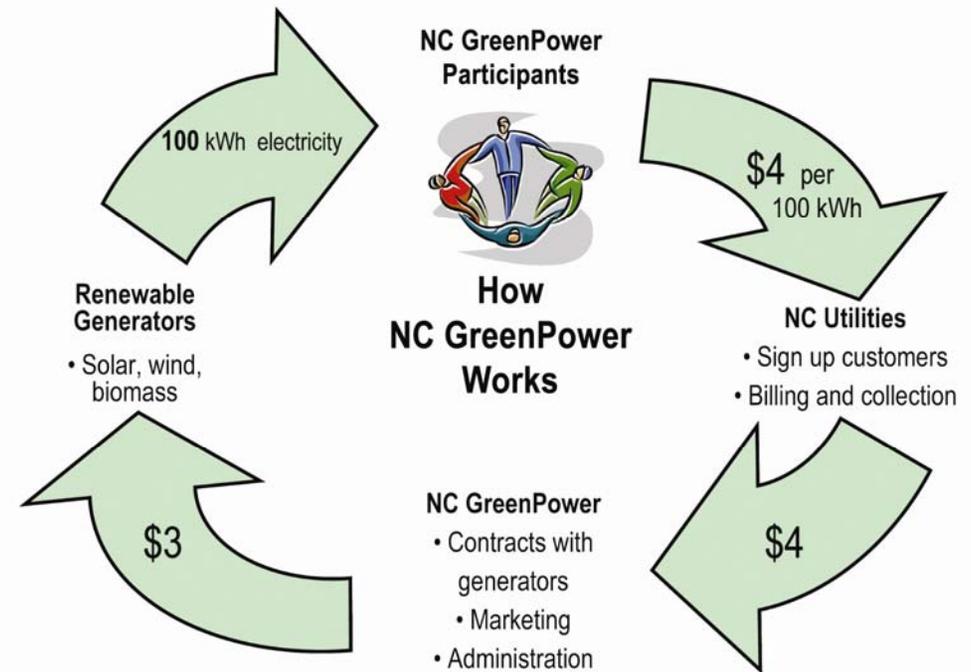
- **35% NC State Tax Credit**

- Solar Water/Space Heating, Solar Electric, Passive Solar, Solar Process Heating, Solar Pool Heating, Daylighting, **Wind**, Biomass, Biofuels, Hydroelectric
- Eligible costs include equipment, design, construction, installation
- Maximum Amount: Varies by technology for residential (\$10,500 for residential wind); \$2.5 million for non-residential
- Terms: Credit taken in year of installation for residential; taken in equal installments over 5 years for non-residential
- Limitations: Credit cannot exceed 50% of taxpayer's tax liability, but unused credit can be carried over for the succeeding 5 years.



NC GreenPower

- Pays a premium to RE generators for their “Renewable Energy Credits” (RECs), also called “green tags”
- Currently \$0.01 - \$0.06/kWh for bioenergy
- \$0.18/kWh for small solar
- \$0.06/kWh for small wind





NC GreenPower for Suppliers

- Most suppliers are selected through a formal Request for Proposals (RFP) process.
- When new generation is required to support NC GreenPower participant subscriptions, the program issues a RFP for specific resources needed to complete the current resource mix.
- An exception to this process involves small wind and solar installations of 10 kW or less capacity. These installations are permitted to enter an expedited generation contract that forgoes the RFP process.



NC Senate Bill 3 - 2007

- 12.5% Renewable Portfolio Standard
 - Includes up to 5% from energy efficiency
 - Based on recent Utilities Commission Study (LaCapra)
- Major Cost Recovery Provisions to Utilities for EE, Clean Smokestacks, Potential New Coal/Nuke Plants
- Tax Relief to Industrials for Electricity



The NC REPS: An Overview

- **Target Percentages & Applicability**

- 10% by 2018 – all electric service providers in state
- 12.5% by 2021 – only investor owned electric utilities (Duke, Progress, Dominion)
- 5th Largest in US in terms of MWh required generation

- **Eligible Technologies**

- Wide range of Renewables (including Wind), Energy Efficiency, thermal technologies (solar thermal & CHP)
- IOUs - Up to 25% of REPS from efficiency by 2018; Up to 40% of REPS from efficiency by 2021
- EMCs and Municipalities - Can meet entire standard (other than Solar Set Aside) with efficiency



Key Features of RPS Policies

- **Technology tiers**
 - Solar carve-out – 0.2% by 2018 (estimated to be around 378 MW capacity)
 - Hog waste-to-energy carve-out – same
 - Poultry litter carve-out – 900,000 MWh by 2018
- **Central and customer-sited systems**
 - Eligible but rules TBD
- **Cost recovery** mechanisms for utilities allowed
- **Emissions Requirements** for Bioenergy



NC Interconnection Standards and Net Metering

- Interconnection (Docket E-100, Sub 101)
 - Standardized IC procedures recently raised by law to 10 MW (currently only goes to 100kW)
 - The law states that the commission "shall adopt, if appropriate, federal interconnection standards."
 - IC Rulemaking underway at NCUC to implement
- Net Metering (Docket E-100, Sub 83)
 - Law requires NCUC to "Consider whether it is in the public interest to adopt rules for electric public utilities for net metering of renewable energy facilities with a generation capacity of one megawatt or less." Current rules cap at 100kW



PROPOSED for 2008
Income Tax Credit – Energy Efficient Homes

- The bill provides an income tax credit for builders and purchasers of federally or state certified energy efficient homes. The credit for builders is:
 - \$1000 for a newly built federally certified home (Energy Star)
 - \$2000 for a newly built state certified home (HBH)
- Was a part of S3 in 2007 but was cut at the last minute. Expected to be revived in 2008.



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