



Environmental Energy Technologies Division

Lawrence Berkeley National Laboratory

# U.S. Renewables Portfolio Standards:

*Past their prime, or primed for progress?*

**Galen Barbose**

*Lawrence Berkeley National Laboratory*

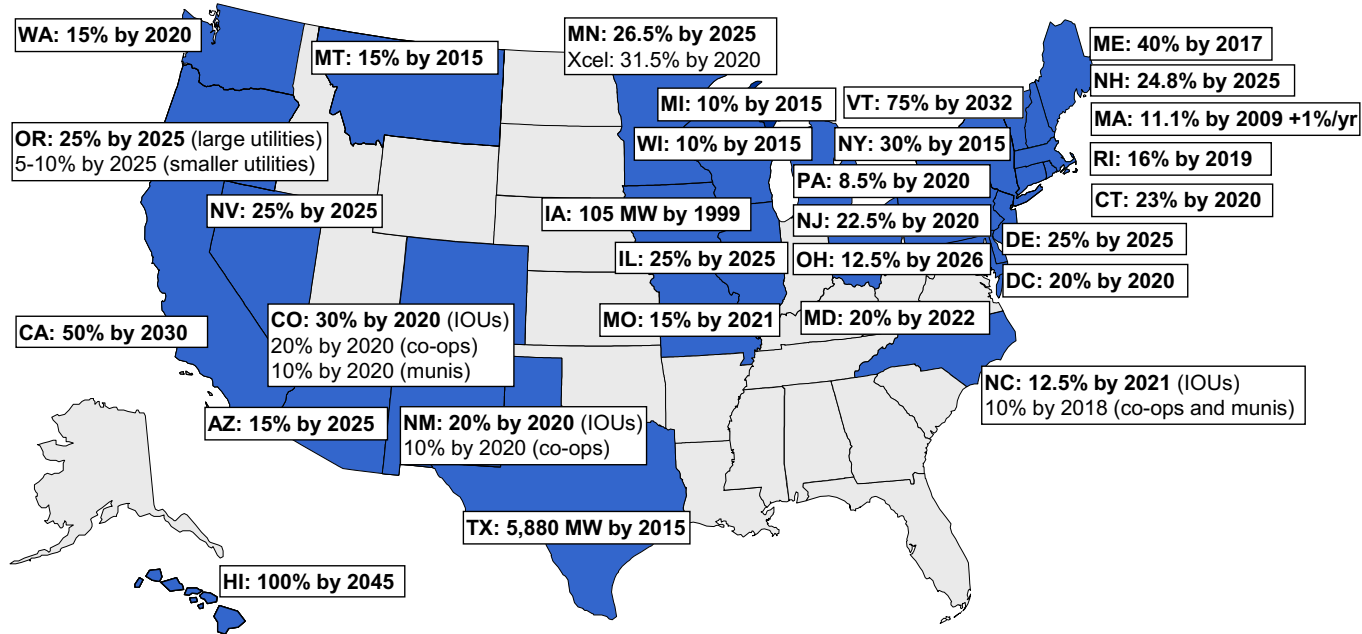
**Renewable Energy Markets 2015**

Washington, D.C.

October 20, 2015

# RPS Policies Exist in 29 States and DC

## Apply to 54% of Total U.S. Retail Electricity Sales



Source: Berkeley Lab

Notes: Compliance years are designated by the calendar year in which they begin. Mandatory standards or non-binding goals also exist in US territories (American Samoa, Guam, Puerto Rico, US Virgin Islands)

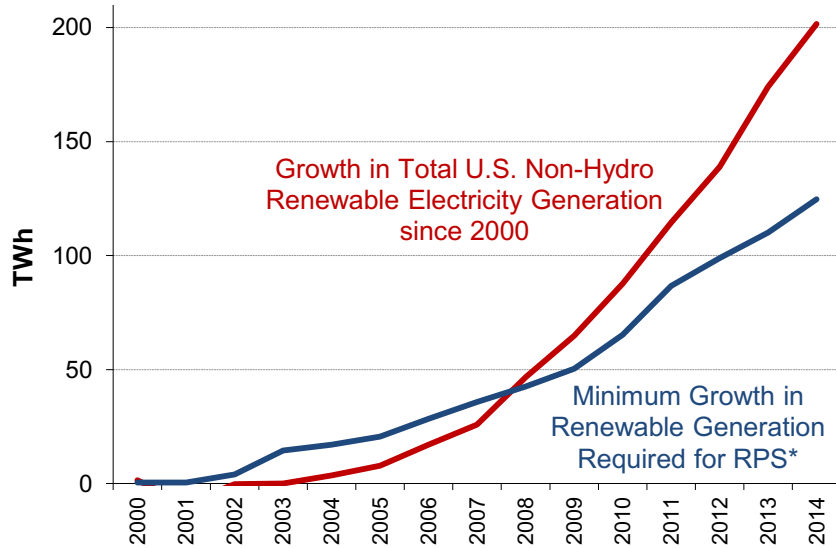
# Legislative Activity on RPS Policies Continues

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- Of the **159** RPS-related bills introduced in 2015 (*Source: EQ Research*):
  - Evenly split between strengthen (**50**), weaken (**56**), or neutral (**53**)
  - **16** enacted as of August 31 (and at least one more since)
- Major legislative revisions enacted in 2015:
  - **CA**: Increased RPS to 50% by 2030
  - **HI**: Increased RPS to 100% by 2045
  - **VT**: Replaced voluntary RE goal with new mandatory RPS (75% by 2032) including a DG set-aside (10% by 2032)
  - **KS**: Repealed RPS and replaced with voluntary RE goal
- One more coming down the pike?
  - **OH**: RPS set to un-freeze in 2017, but legislative committee recently recommended indefinite freeze until “100% certainty the CPP becomes effective”

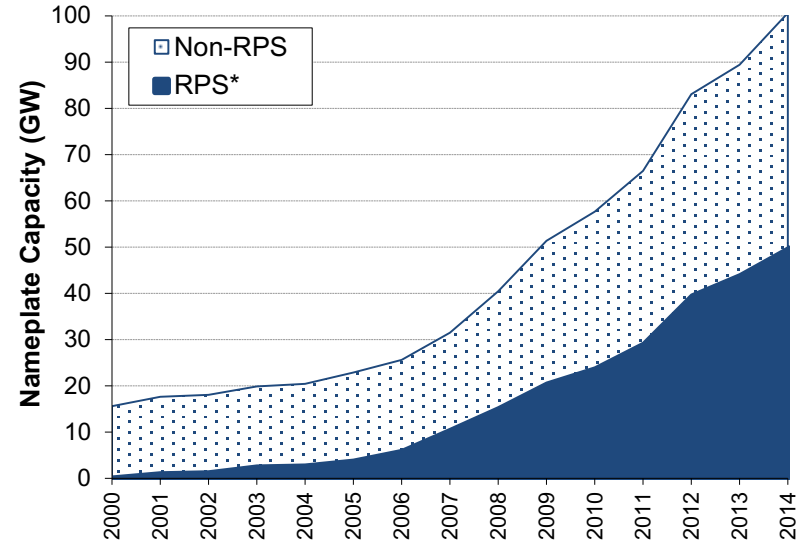
# RPS Demand a Key Driver for RE Growth Since 2000: 62% of Increased Generation, 58% of New Capacity

## Growth in U.S. Renewable Electricity Generation (TWh)



\* Min. Growth Required for RPS accounts for the use of pre-2000 vintage facilities in meeting RPS obligations, where it occurs

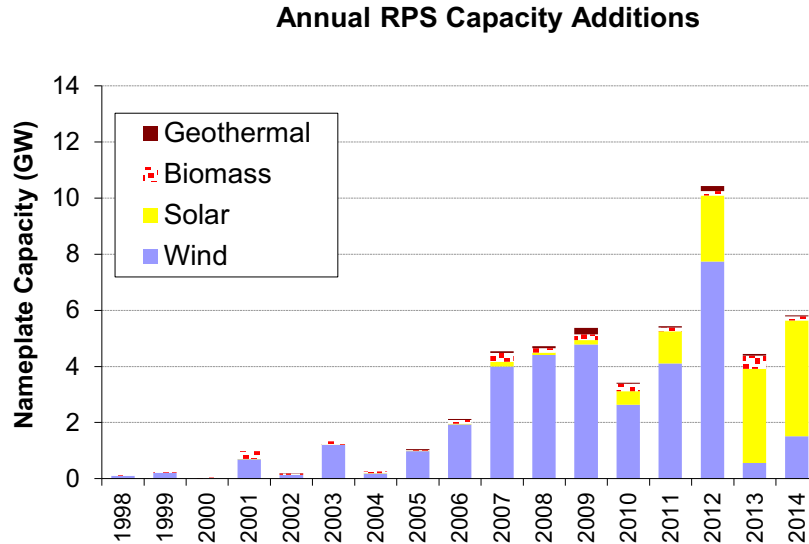
## Total U.S. Renewable Generation Capacity (GW)



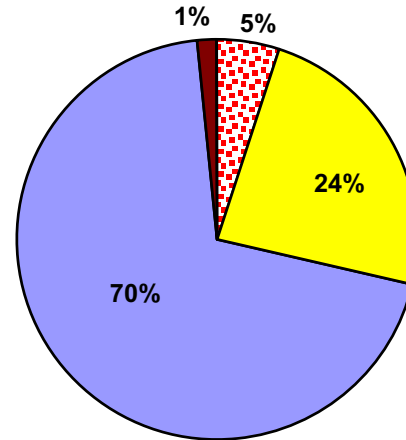
\* RPS capacity: The entity purchasing RECs is subject to an RPS, and the project commenced operation after enactment of the RPS

# Wind Was Historically the Dominant New-Build for RPS, but Solar Has Recently Taken Over

## RPS Capacity Additions from 1998-2014, by Technology Type



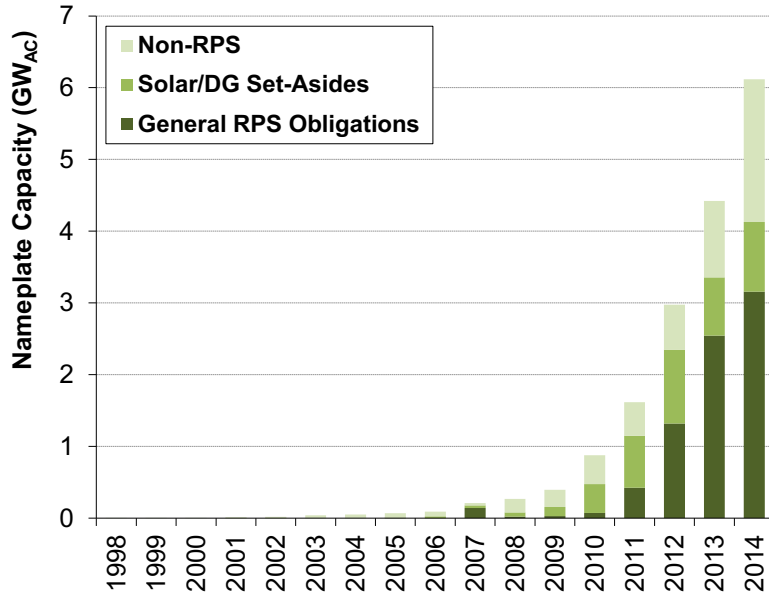
Cumulative RPS Capacity Additions



Notes: Renewable additions are counted as "RPS-related" if and only if the entity receiving RECs from the project is subject to RPS obligations, and the project commenced operation after enactment of the RPS. On an energy (as opposed to capacity) basis, wind energy represents approximately 71%, biomass 13%, solar 12%, and geothermal 4% of cumulative RPS-related renewable energy additions, if estimated based on assumed capacity factors.

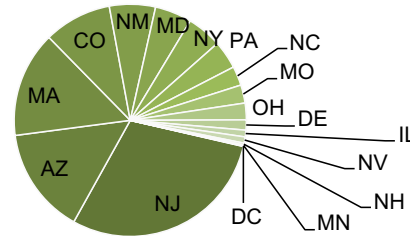
# RPS Solar Additions Driven by Combination of General RPS Obligations and Solar/DG Set-Asides

Annual Solar Capacity Additions

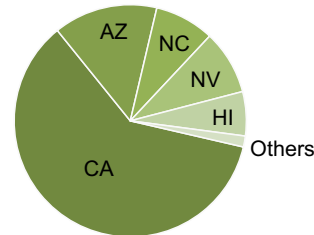


Cumulative RPS Solar Capacity Additions

Solar/DG Set-Asides (4.2 GW)



General RPS Obligations (7.7 GW)



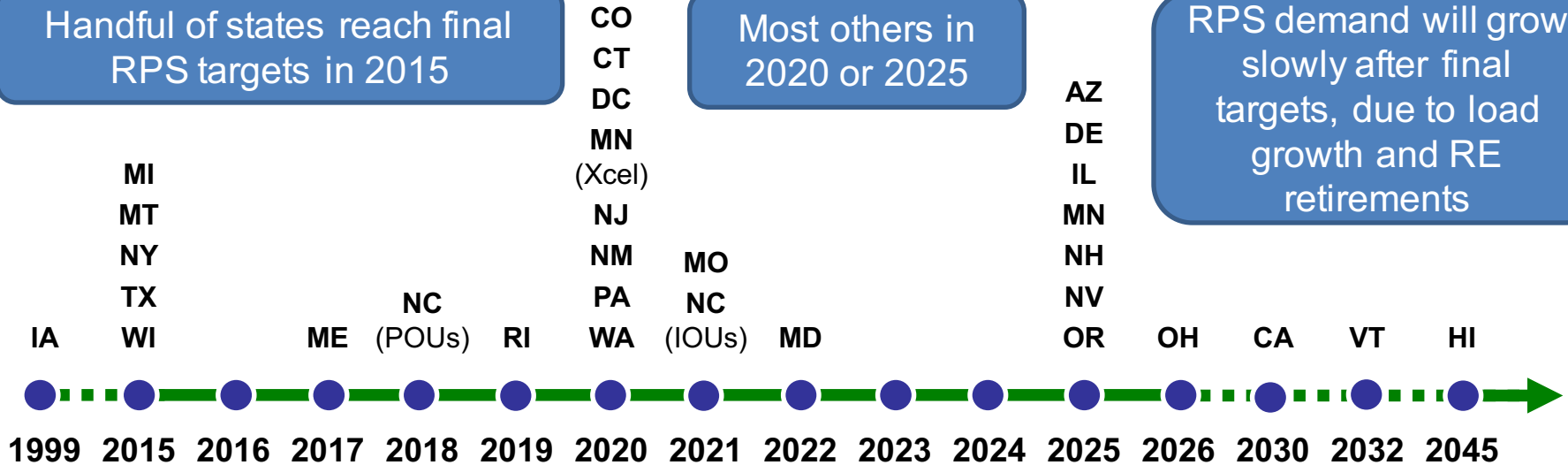
# States Are Starting to Approach Final Targets

## Year of Final RPS Target

Handful of states reach final RPS targets in 2015

Most others in 2020 or 2025

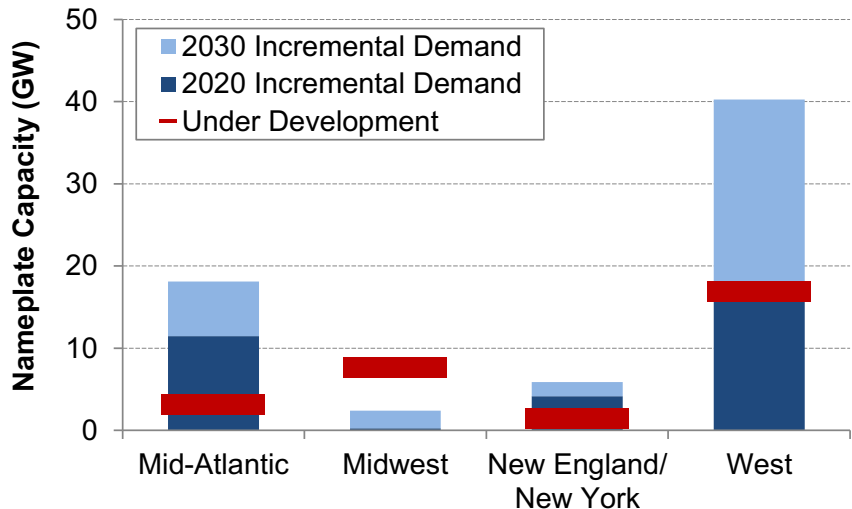
RPS demand will grow slowly after final targets, due to load growth and RE retirements



In addition, many states or utilities are ahead of schedule relative to current-year RPS requirements

# Significant Incremental RPS Demand Remains

## Incremental RPS Demand Relative to 2014 RPS Supply



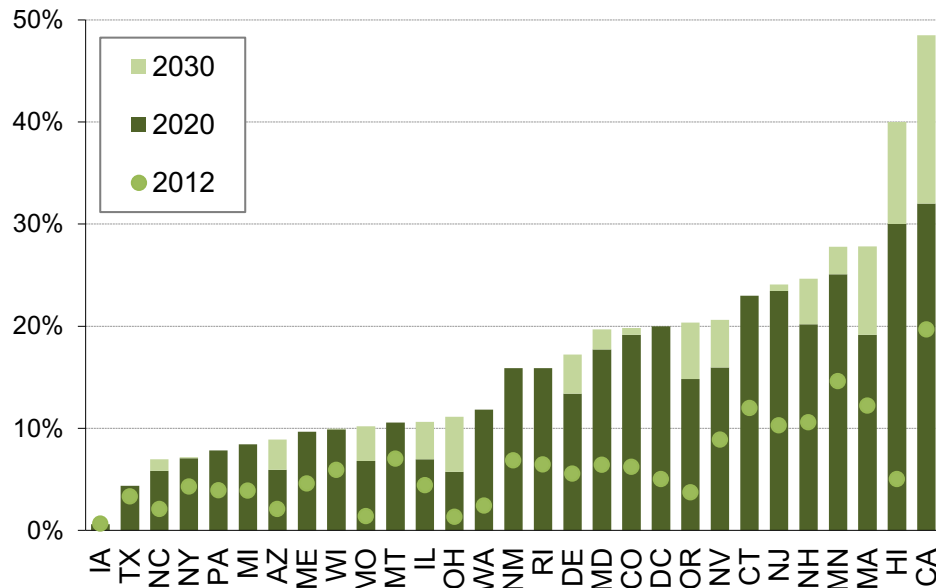
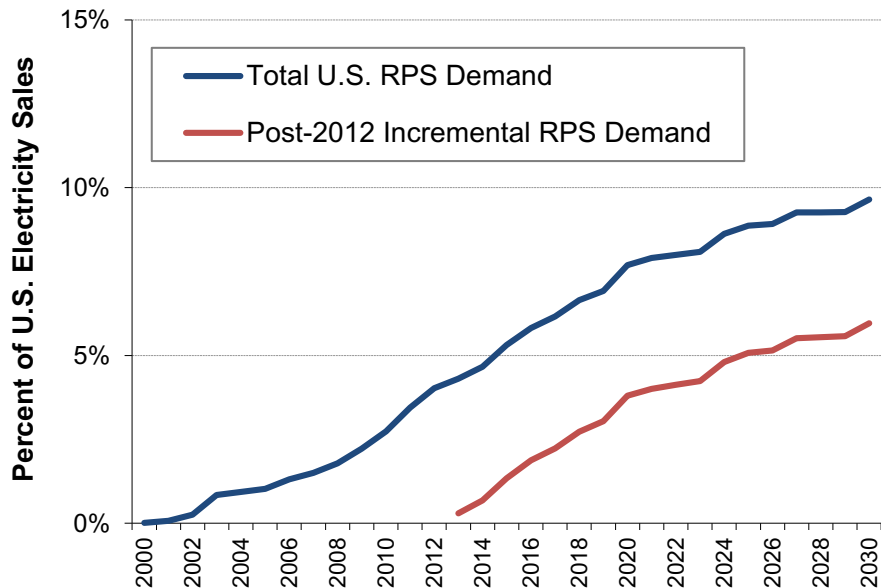
Notes: Incremental demand is measured relative to 2014 renewables capacity under contract to RPS-obligated entities or otherwise assumed to be used for RPS compliance. Capacity under development includes plants permitted or under construction as of Sept. 2015 or completed in 2015 (Source: Ventyx/ABB Velocity Database).

- Meeting future RPS demand will require an additional 32 GW of RE capacity by 2020 and 67 GW by 2030; by comparison:
  - RPS-builds to-date = 50 GW
  - Total U.S. RE in 2014 = 100 GW
- Equates to annual build-rate of 5.4 GW/yr through 2020, 3.5 GW/yr from 2020-2030
  - Compared to average RPS build-rate of 5.9 GW/yr since 2010
- Much of the incremental RPS demand through 2020 may be met with capacity already under development (esp. in West)
  - Though not all of that capacity will be built or available for RPS compliance



# RPS Impacts on CPP Compliance Depend on Rate vs. Mass-Based Approach and Vary by State

## RPS Demand as Percentage of Retail Electricity Sales



Under rate-based approach, only RE capacity built after 2012 is eligible for credit

# The Future Role and Impact of State RPS Programs Will Depend On...

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## Endogenous Factors

- ➔ Legislative and legal challenges to state RPS programs
- ➔ RPS compliance costs and ACPs/cost caps
- ➔ Whether/how RPS programs are re-tuned, expanded

## Exogenous Factors

- ➔ CPP compliance strategies
- ➔ Federal ITC and PTC
- ➔ The many related issues affecting RE deployment (integration, siting, net metering, etc.)

# Thank You!

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## For further information:

LBL RPS publications and resources:

[rps.lbl.gov](https://rps.lbl.gov)



LBL renewable energy publications:

[emp.lbl.gov/reports/re](https://emp.lbl.gov/reports/re)

Contact information:

Galen Barbose, [gbarbose@lbl.gov](mailto:gbarbose@lbl.gov), 510-495-2593