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# U.S. State Renewables Portfolio & Clean Electricity Standards: 2024 Status Update

Galen Barbose

August 2024

Download report and supporting materials at: [rps.lbl.gov](https://rps.lbl.gov)



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# Acronyms

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**ACP:** Alternative compliance payment

**CCA:** Community choice aggregator

**CES:** Clean electricity standard

**DG:** Distributed generation

**DPU:** Department of Public Utilities

**EIA:** Energy Information Administration

**ESP:** Electricity service provider

**GW:** Gigawatt

**GWh:** Gigawatt-hour

**IOU:** Investor-owned utility

**LSE:** Load-serving entity

**MSW:** Municipal solid waste

**MW:** Megawatt

**MWh:** Megawatt-hour

**NEPOOL:** New England Power Pool

**OSW:** Offshore wind

**POU:** Publicly owned utility

**PPA:** Power purchase agreement

**PUC:** Public utilities commission

**RE:** Renewable electricity

**REC:** Renewable electricity certificate

**RPS:** Renewables portfolio standard

**SACP:** Solar alternative compliance payment

**SREC:** Solar renewable electricity certificate

**TWh:** Terawatt-hour

# Highlights

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**Evolution of state RPS and CES programs:** States continue to refine and revise their RPS policies, often by adopting higher targets and/or broader CES policies. Among the 29 states plus DC with an RPS, 16 have RPS targets of at least 50% of retail sales, and 4 states have a 100% RPS. Sixteen states have adopted a broader 100% CES, most of which also have an RPS.

**Historical impacts on renewables development:** Almost half of all growth in U.S. renewable electricity (RE) generation and capacity since 2000 is nominally associated with state RPS requirements. That percentage has declined over time to 35% of all U.S. RE capacity additions in 2023, though in certain regions RPS policies continue to play a dominant role in driving RE growth.

**Future RPS and CES demand and incremental needs:** The combined demand for clean electricity from RPS and CES policies will grow from roughly 500 TWh today to 1700 TWh by 2050. Accounting for current supplies—including existing nuclear and hydroelectric generation eligible for CES targets—RPS and CES policies will require 900 TWh of new clean electricity by 2050, requiring roughly 3x the historical rate of RPS-buildout.

**RPS target achievement to-date:** States have generally met their interim RPS targets in recent years, with only a few exceptions reflecting unique, state-specific issues. Most CES targets are not yet in force, and so states have little compliance experience to-date with those policies.

**REC pricing trends:** Prices for NEPOOL Class I RECs remained at roughly \$40/MWh over the past year, just below ACP rates in the larger state markets, while PJM Tier I REC prices continued to rise, reaching \$35/MWh by year-end 2023 and surpassing ACP levels in some states. Prices for solar RECs remained relatively stable, and continue to exhibit wide variation across states, with the highest prices (\$200-450/MWh) in NJ, MA, and DC.

**RPS compliance costs:** RPS compliance costs average roughly 4% of retail electricity bills across RPS states, though vary widely from state to state, with the highest costs (11-12% of retail bills) in states with solar carve-outs and high SREC prices.

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- Compliance Costs
- Outlook

***Additional supporting data and documentation available at: [rps.lbl.gov](https://rps.lbl.gov)***

- RPS & CES annual percentage targets by state
- RPS & CES demand projection and underlying load forecasts



# Evolution of State RPS and CES Programs



# The Scope of This Report

**This report covers U.S. state renewables portfolio standards (RPS) and clean electricity standards (CES)**

**Renewables Portfolio Standard (RPS):** A binding requirement on retail electric suppliers to procure a minimum percentage of generation from eligible sources of renewable electricity

**Clean Electricity Standard (CES):** Similar to an RPS, but target is based on a broader set of eligible technologies; may not (yet) have a defined implementation/enforcement mechanism

**Electric-Sector Emissions Standard:** Considered here to be a CES variant, but target is defined as a percentage reduction in electric-sector emissions relative to a baseline

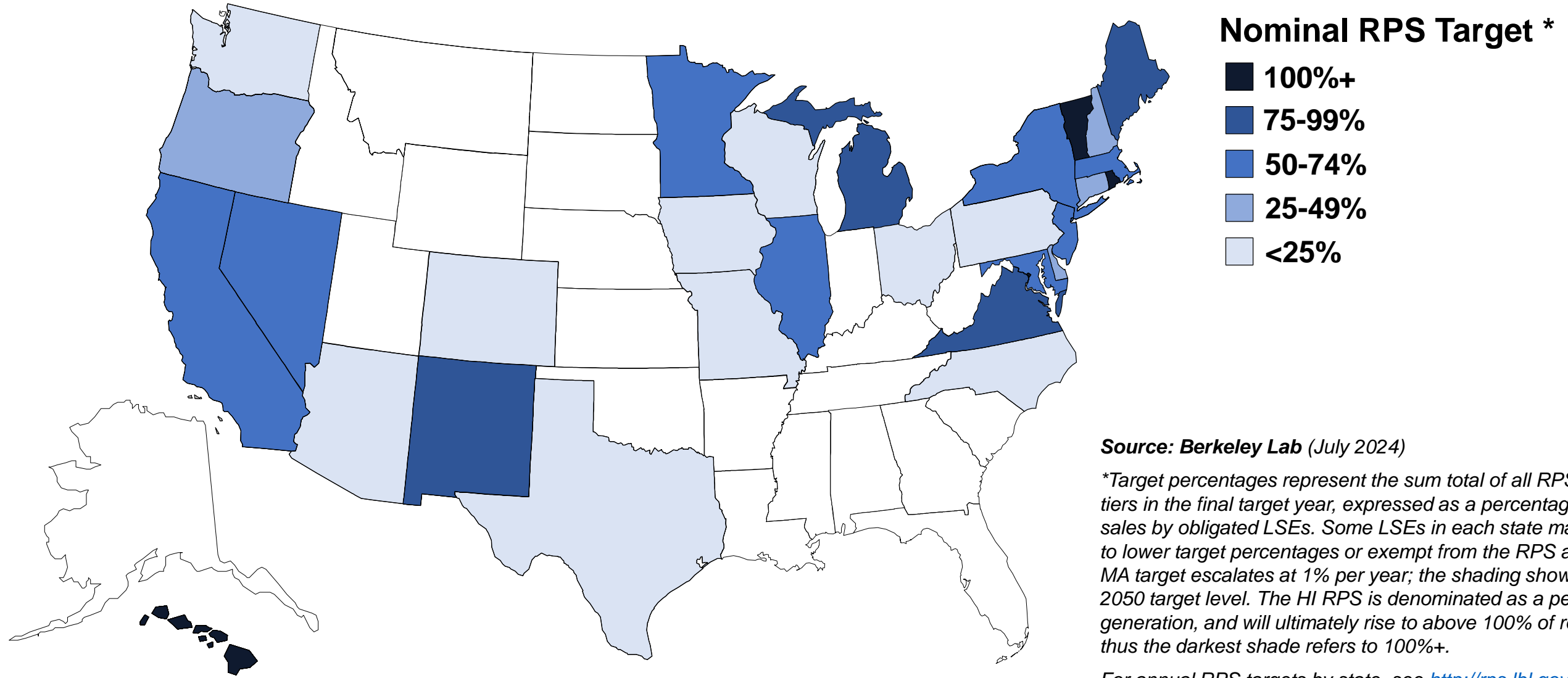
## **Excluded from the Report:**

- ❑ Economy-wide carbon reduction targets without an electric sector-specific standard
- ❑ Targets adopted voluntarily by utilities or corporations, or targets established through executive order
- ❑ U.S. territories (though several, including Puerto Rico, do have an RPS or CES)



# 29 States + DC Have Mandatory RPS Policies

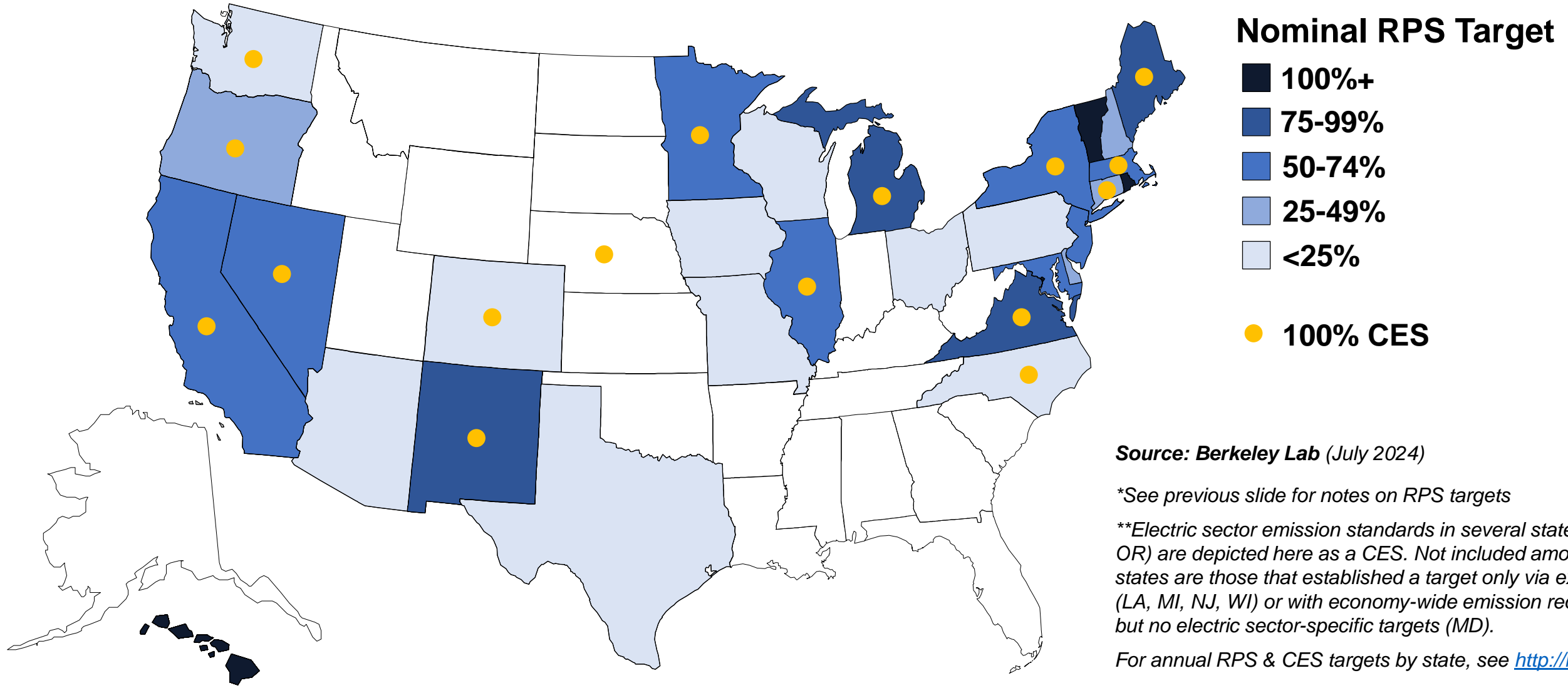
16 have final targets  $\geq 50\%$  of retail sales, and 4 have a 100% RPS



For annual RPS targets by state, see <http://rps.lbl.gov>

# 16 States Have Established a Broader 100% CES \*\*

Typically in combination with an RPS

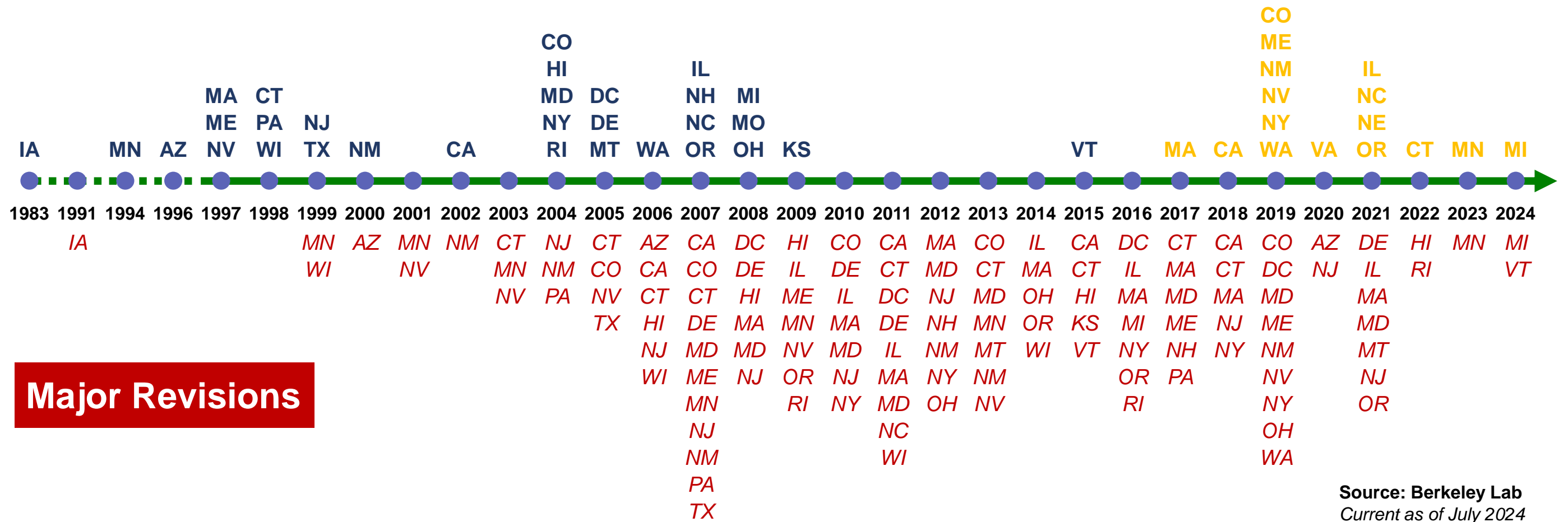


# Most RPS Policies Have Been on the Books for More Than a Decade

## But states continue to make significant revisions & adopt new CES'

### RPS Enactment

### CES Enactment



### Major Revisions

Source: Berkeley Lab  
Current as of July 2024

# RPS and CES Legislation in 2023 and Q1 2024

## RPS & CES Related Bills since Jan. 2023

	Strengthen	Weaken	Neutral	Total
<b>Introduced</b>	<b>46</b>	<b>24</b>	<b>42</b>	<b>112</b>
<b>Enacted</b>	<b>5</b>	<b>0</b>	<b>8</b>	<b>13</b>

*Data Source: EQ Research (March 31, 2024) and Berkeley Lab*

*Notes: Companion bills counted as a single bill*

- Most proposals sought to strengthen or make neutral/technical changes to existing programs, a small fraction of which were ultimately enacted
- Among those bills signed into law, VT raised their RPS to 100% (over-riding governor's veto), and MI and MN both raised their RPS and created a new 100% CES
- Other enacted revisions were all relatively minor

## Enacted Bills that Strengthen or Weaken

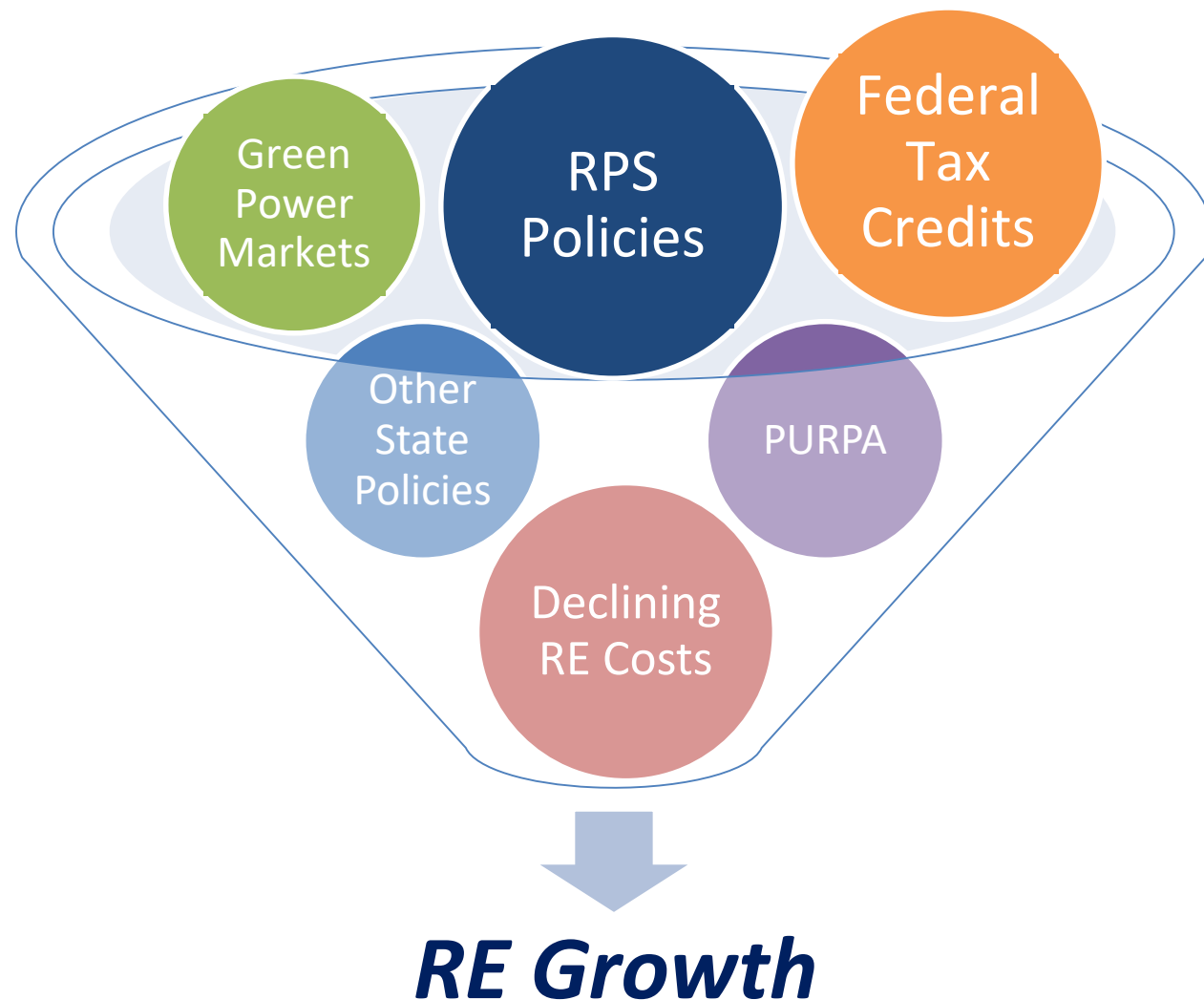
State	Bill	Key Changes
<b>CO</b>	SB 198	Extended clean electricity planning requirements to additional utilities
<b>MI</b>	SB 271	Raised the RPS to 60% by 2035 and created a new 100% CES by 2040
<b>MN</b>	HF 2310	Raised the solar carve-out for large utilities and created a carve-out for small utilities
<b>MN</b>	HF 7	Established new 100% CES by 2040 and increased RPS to 55% by 2035
<b>VA</b>	HB 2444	Accelerates offshore wind target by two years, from 2034 to 2032
<b>VT</b>	H 289	Raised RPS to 100% by 2030 for most utilities, increased DG carve-out, and created new requirement for new renewable energy



# Historical Impacts of State RPS and CES Policies on Renewables Development



# RPS Policies Exist amidst a Broader Array of Market and Policy Drivers for RE Growth



*Parsing out the incremental impact of individual drivers for RE growth is challenging, given the many overlaps and interactions*

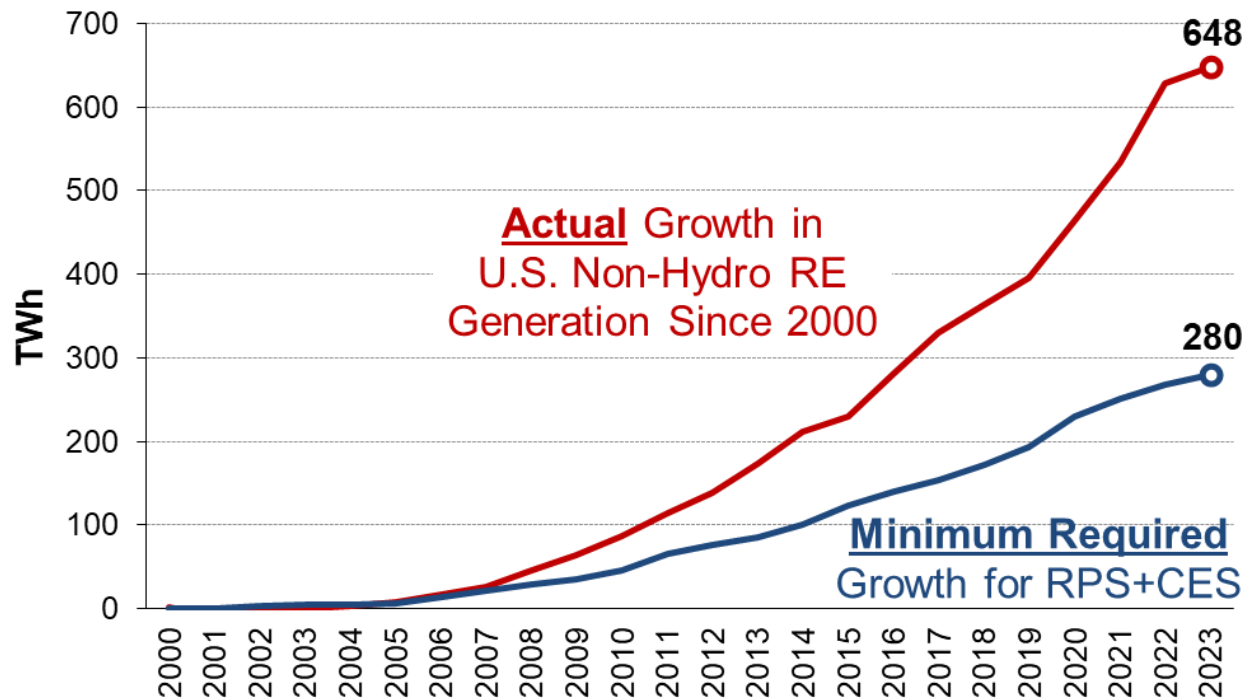
**We present two simple approaches for gauging the impact of RPS policies on RE growth—*without claiming strict attribution*:**

1. Compare total historical RE growth to the minimum amount required to meet RPS demand
2. Quantify the portion of historical RE capacity additions directly serving entities with RPS obligations or certified for RPS eligibility

# U.S. Renewable Generation Has Grown Faster than RPS Demand

RPS policies have been one of the key drivers

## Growth in Non-Hydro Renewable Generation: 2000-2023



Notes: Minimum Growth Required for RPS excludes contributions compliance from pre-2000 vintage facilities, and from hydro, municipal solid waste, nuclear, and other non-RE technologies. This comparison focuses on non-hydro RE, because RPS rules typically allow only limited forms hydro for compliance.

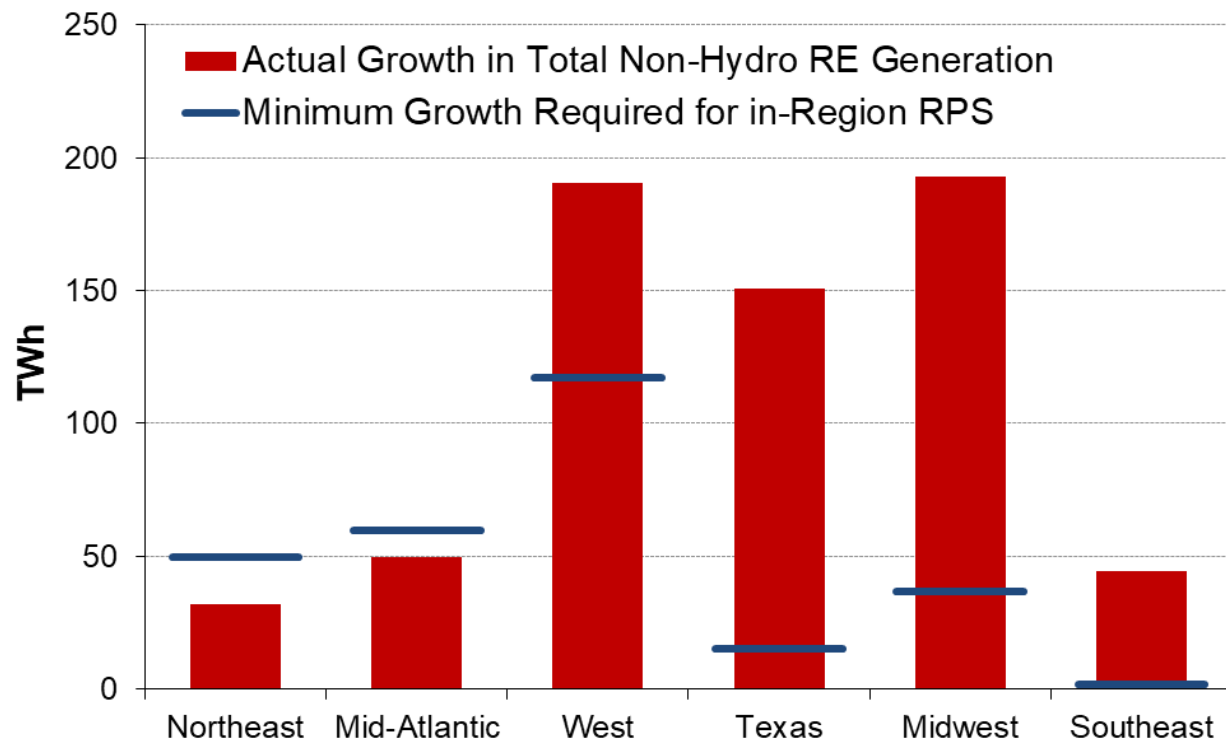
- Total non-hydro RE generation in the U.S. has grown by 648 TWh since 2000
- RPS+CES policies required a 280 TWh increase over the same period (43% of total RE growth)
- Provides a rough indication of policy impact, but not a precise attribution
  - ▣ Some of that growth would have occurred without RPS+CES requirements
  - ▣ Conversely, RPS+CES policies have likely had some spill-over effects, facilitating non-RPS-related growth
  - ▣ Also potentially some RE build out occurring in advance of future CES targets that aren't yet binding
- RE growth outside of RPS's associated with voluntary utility procurement, green power markets, and net-metered PV



# RPS & CES Role in Driving RE Growth Varies by Region

Most critical in the Northeast and Mid-Atlantic; less so in other regions

## Growth in Non-Hydro Renewable Generation: 2000-2023



*Notes: Northeast consists of New England states plus New York. Mid-Atlantic consists of states that are primarily within PJM, in terms of load served. The comparisons shown here should be not interpreted as indicative of compliance levels; see later sections of the report for data on historical compliance levels by state.*

**Northeast and Mid-Atlantic:** RPS needs have outpaced actual in-region RE growth (deficit partly met by imports), suggesting that RPS demand has been a key driver of non-hydro RE growth

**West:** Actual RE growth has exceeded RPS requirements, partly due to net metered PV (which is mostly not used for RPS)

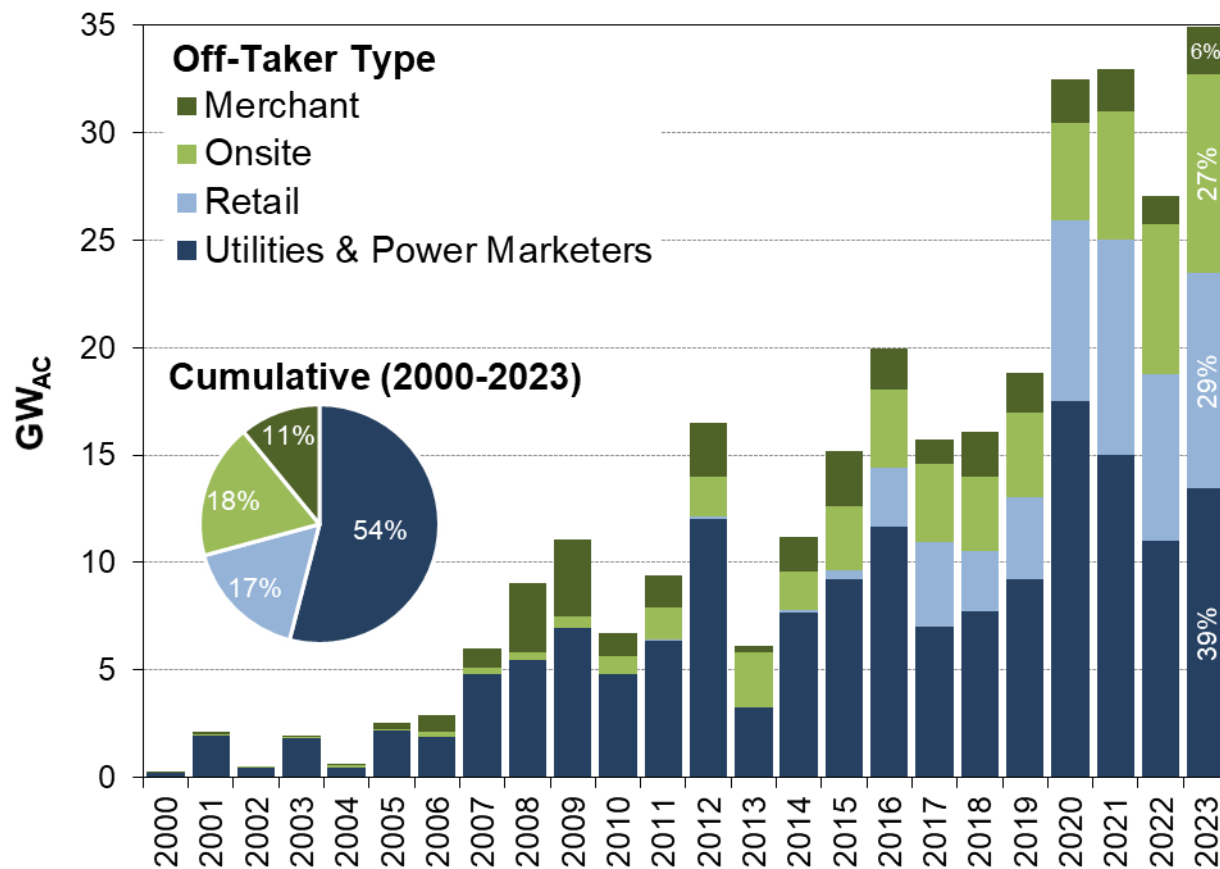
**Texas and the Midwest:** RE growth has far outpaced RPS needs, driven by attractive economics of wind and solar

**Southeast:** Negligible regional RPS demand (NC), though some RE growth serves RPS demand in PJM



# Most Renewable Capacity is Sold to Utilities & Power Marketers, but Retail & Onsite Projects Are a Growing Share

## Annual Renewable Capacity Additions



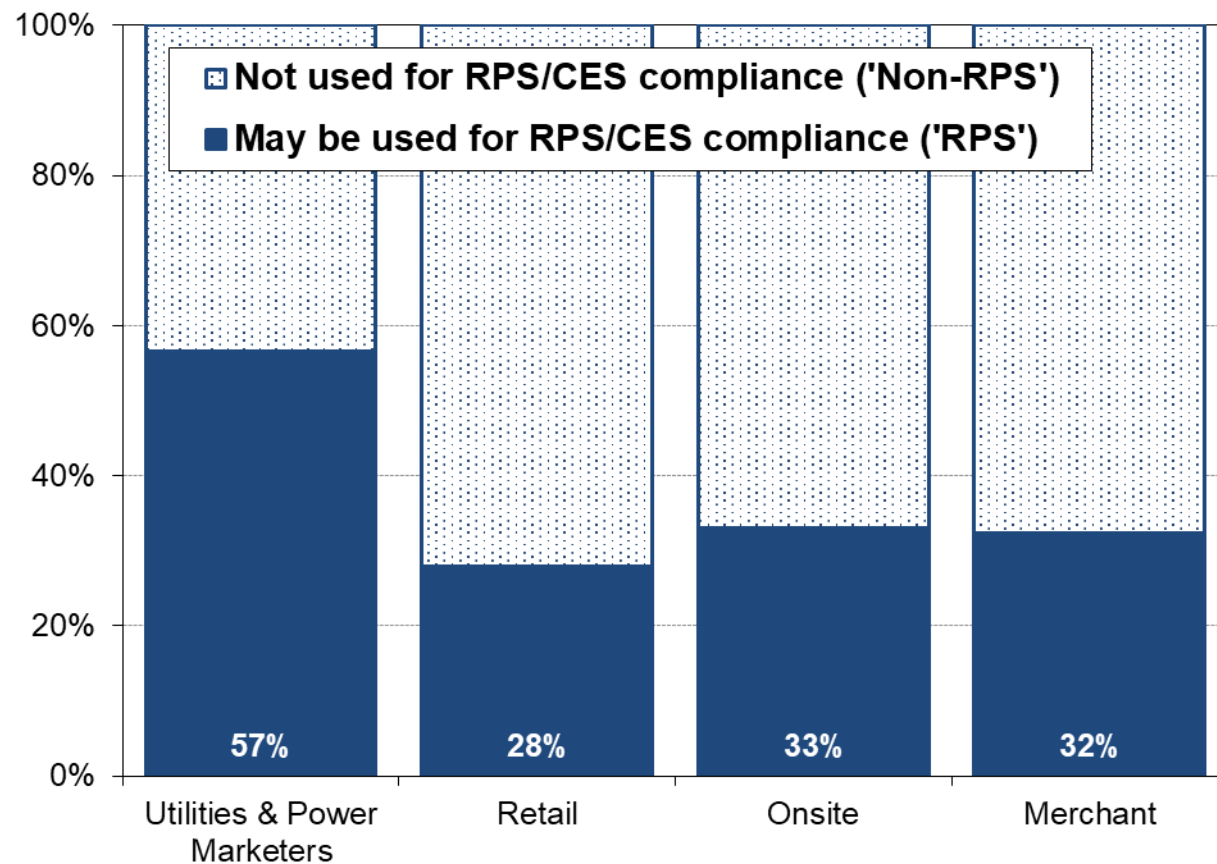
Sources: LBNL, ABB Ventyx, EIA, American Clean Power Association

- Total renewable capacity additions in 2023 totaled 35 GW
- Utilities and power marketers (load-serving entities) continue to represent the largest class of off-takers for new RE capacity capacity (39% in 2023, 54% cumulatively)
- Retail off-takers (corporate PPAs and community solar), have become more prominent since 2020, comprising 29% of new RE capacity added in 2023
- Onsite projects (primarily distributed solar) have grown steadily over time, representing 27% of RE adds in 2023
- Merchant sales have a long history but are presently a small share of new RE additions (6% in 2023)

*Definitions:* **Utilities & Power Marketer** projects are those where the power is sold to or owned by utilities or competitive retail electricity suppliers. **Retail** projects are those where the power is sold to specific end-use customers through corporate PPAs, commercial green power tariffs, or community solar arrangements. **Onsite** projects are those installed at customer facilities and used to directly serve onsite load (i.e., behind-the-meter). **Merchant** projects are those where the power is sold into wholesale spot markets. In cases where details about the off-taker have not been disclosed, Berkeley Lab makes a best guess as to the most likely type of off-taker, based on project attributes and regional trends.

# Within Each Class of Off-takers, a Portion of RE Capacity Additions Is—or May Be—Used for RPS/CES Compliance

## Percent of Cumulative Renewable Capacity Additions by Off-Taker (2000-2023)



Notes: Going forward, we use the shorthand “RPS” and “Non-RPS” to refer to the categorization shown here, based on the decision-rules explained to the right.

The criteria for assessing whether a project may be used for RPS compliance depend on the off-taker type and region:

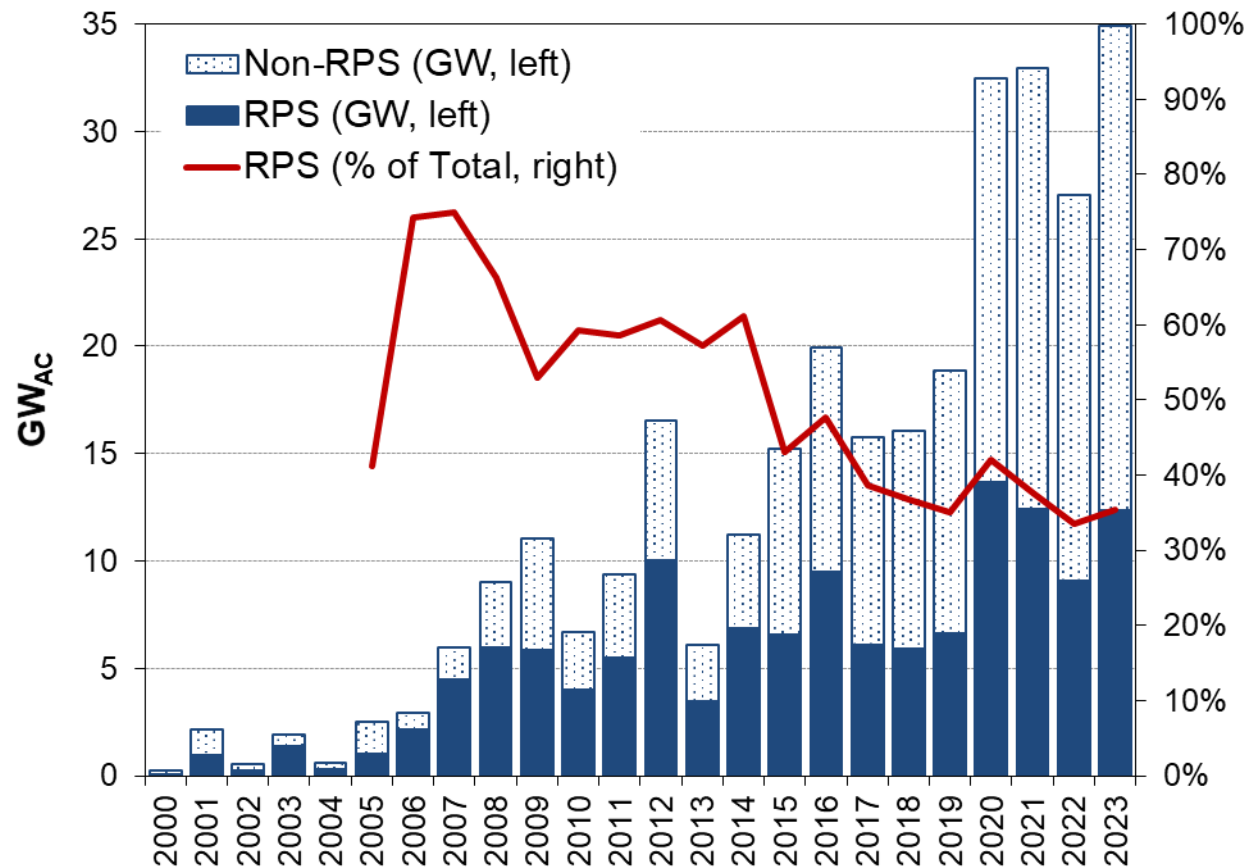
- **Utilities & Power Marketers:** Roughly **57%** of RE capacity additions since 2000 is owned by or contracted to load serving entities with active RPS or CES compliance obligations
- **Retail:** Roughly **28%** of capacity additions has been certified for RPS eligibility in one or more state, meaning that the RECs *could* be re-sold for RPS compliance (and potentially “swapped out” with cheaper voluntary-market RECs)
- **Onsite:** Roughly **33%** of capacity adds (almost all DG PV) is either being claimed by a utility for RPS compliance (typically through an incentive program) or is RPS-certified in one or more state and thus potentially selling SRECs into the RPS market
- **Merchant:** Roughly **32%** of capacity additions has been certified for RPS compliance in PJM or ISO-NE, or was developed in Texas during the period when the state’s RPS was binding

*These percentages represent upper bounds on the portion of new RE capacity actually being applied toward RPS compliance*

# RPS' Have Provided a Stable Source of Demand for RE New-Builds

## Even if RPS *portion* of annual RE capacity additions has declined over time

### Annual Renewable Capacity Additions

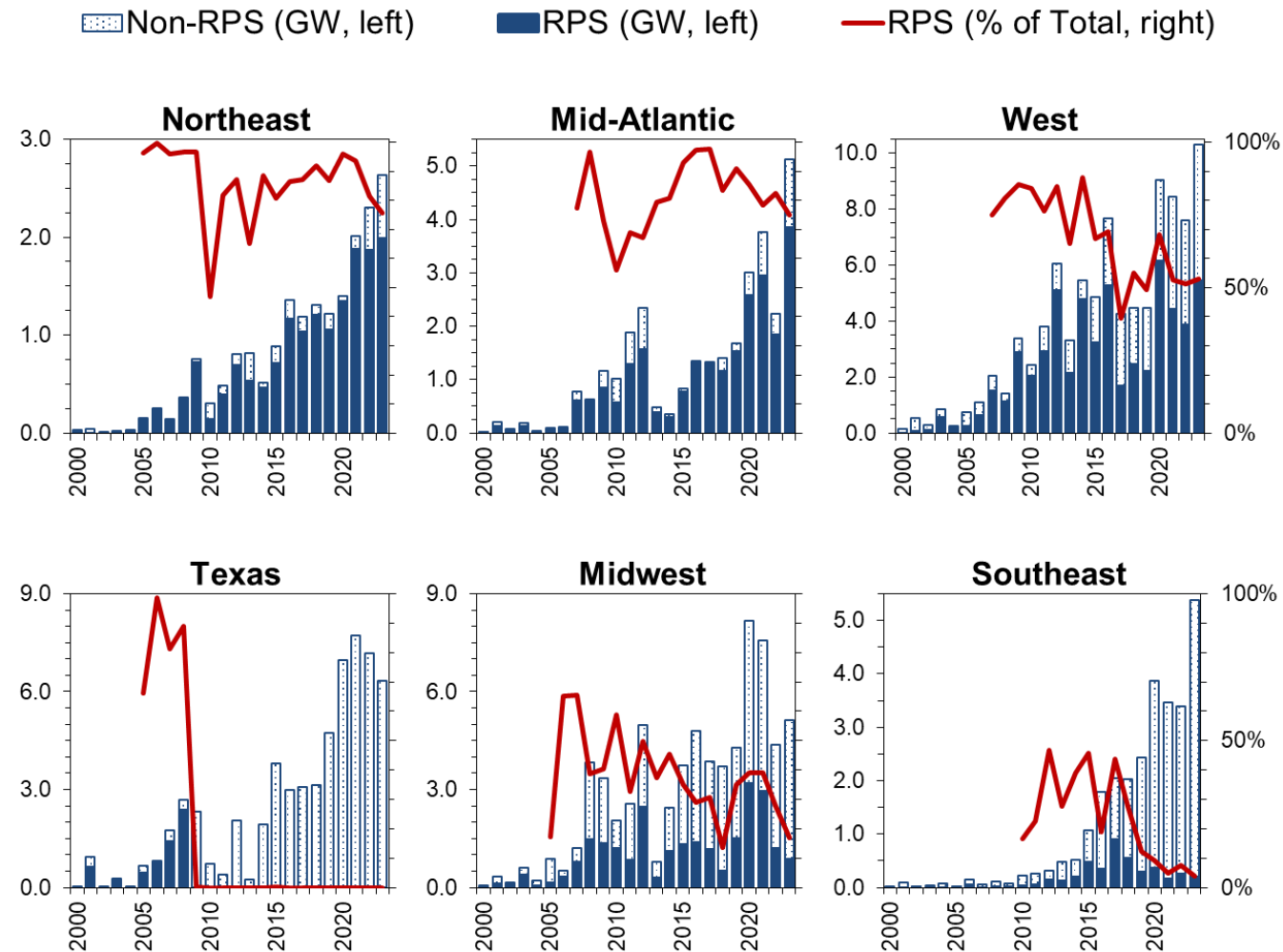


Notes: The criteria for assessing whether a project may be used for RPS compliance depend on the off-taker type and region. See previous slide for further details.

- “RPS-related” RE capacity additions have generally grown over time, representing 12.4 GW of new RE adds in 2023
- Cumulatively, RPS-related capacity additions comprise 45% of all RE capacity adds since 2000 (134 GW out of 300 GW)
- That share has declined over time, dropping to 35% of RE additions in 2023, compared to 60-70% in earlier years, owing to more-rapid growth in the voluntary markets
- Non-RPS capacity additions in 2023 consisted of roughly equal shares of:
  - ▣ Corporate PPAs and community solar not certified for RPS eligibility (7.3 GW)
  - ▣ Onsite solar not used for RPS (7.1 GW, largely in CA, FL, TX)
  - ▣ Utility/power marketer procurement in non-RPS states (6.7 GW, mostly in TX, Midwest, Southeast)

# RPS Policies Remain Central to RE Growth in Particular Regions

## Recent RE additions in Northeast and Mid-Atlantic primarily serve RPS demand



Notes: See previous slide for regional definitions and further details on the criteria for sorting RE capacity additions into RPS and Non-RPS categories.

### RPS policies have been a larger driver in...

- ▣ **Northeast:** Relatively small market, but almost all RE capacity additions serving RPS demand, consisting mostly of onsite and community solar in recent years
- ▣ **Mid-Atlantic:** Mostly solar carve-out capacity and corporate PPAs with RPS-certified projects potentially selling RECs into compliance markets
- ▣ **West:** RPS additions driven by aggressive long-term RPS and CES targets throughout the region; non-RPS additions are mostly onsite solar

### But have been a smaller driver in...

- ▣ **Texas:** Achieved its final RPS target in 2008 (7 years ahead of schedule); all growth since is Non-RPS
- ▣ **Midwest:** Lots of wind development throughout the region, some contracted to utilities with RPS needs
- ▣ **Southeast:** RE growth primarily driven by utility procurement and PURPA



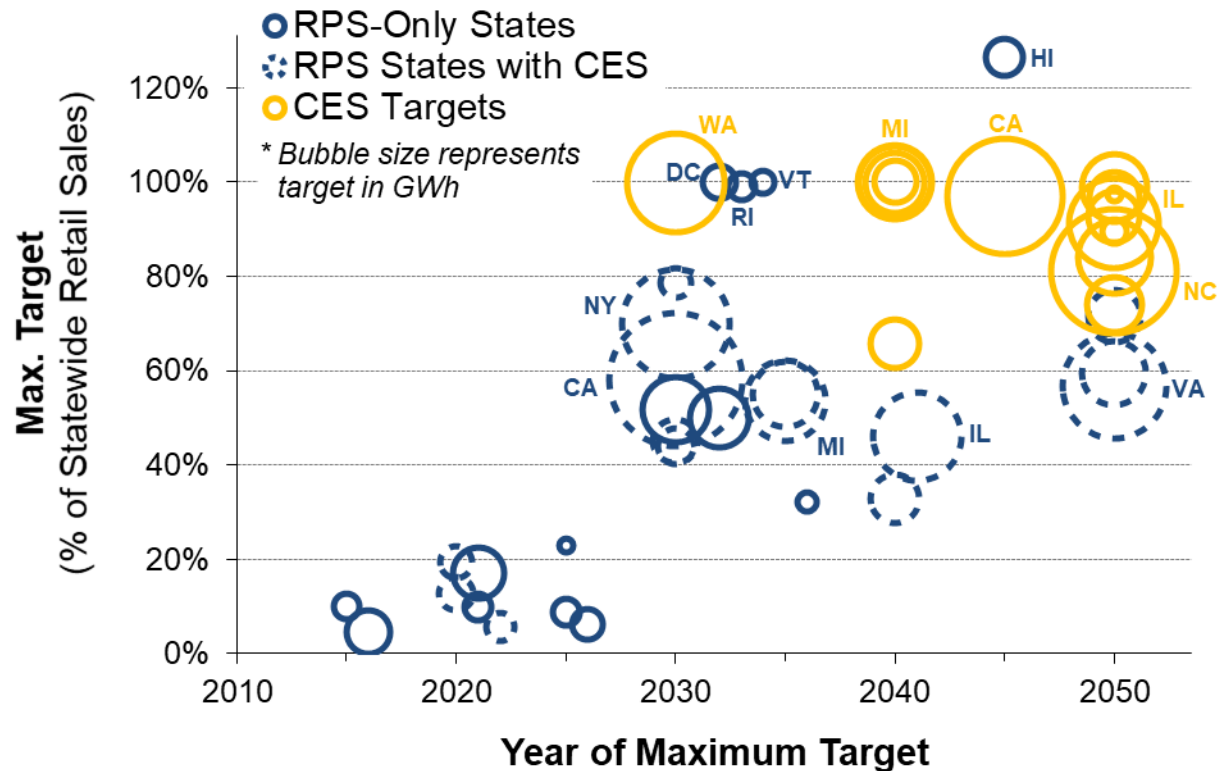
# Projected RPS & CES Demand and New Supply Needs





# Target Levels and Timeframes Vary Widely

## Max. RPS & CES Targets and Target Years



Notes: The figure shows each state's maximum RPS and CES percentage target and the associated year when that target must be reached. Targets are shown here as the percentage of total statewide retail sales, which may differ from nominal targets if those apply to only a subset of LSEs in a state. The RPS target for HI is denominated as a percent of total statewide generation, and thus is greater than 100% of retail sales. Bubble sizes represents the target in GWh terms; in the case of the CES targets, bubble sizes reflects only the incremental GWh above and beyond the RPS.

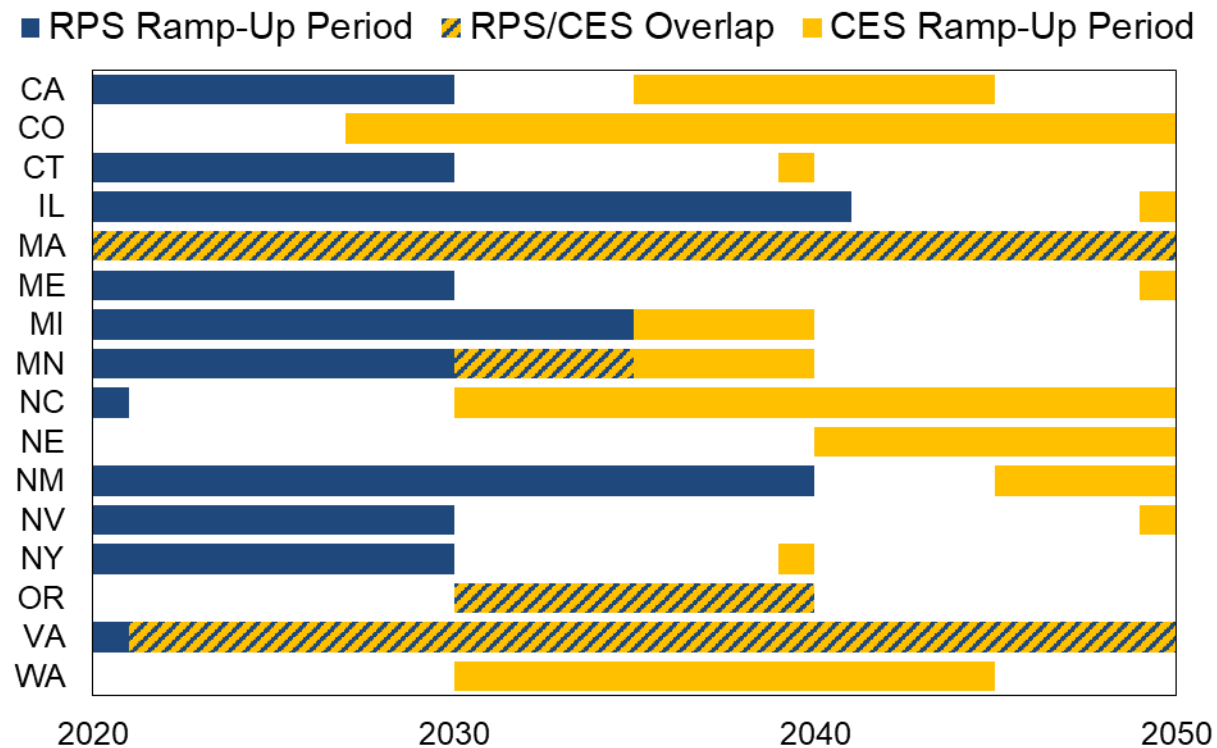
- Targets translated into a percentage of *statewide* retail sales (to provide comparability)
- RPS states can be grouped into three sets
  - ▣ Legacy RPS programs with final targets of roughly 15-25% by 2015-2025
  - ▣ A sizeable contingent of states with higher RPS targets ( $\geq 50\%$ ) in the 2030-2035 timeframe
  - ▣ States with similarly high targets but longer timeframes (2040-2050)
- Most of the states in the latter two groups, with relatively high RPS targets, have also adopted even higher, longer-term CES targets

Annual RPS & CES percentage targets by state available for download at: [rps.lbl.gov](https://rps.lbl.gov)

# Applicable RPS and CES Timelines

The figure shows the years over which each state's RPS and CES are ramping up

## RPS and CES Ramp-Up Periods (CES States Only)



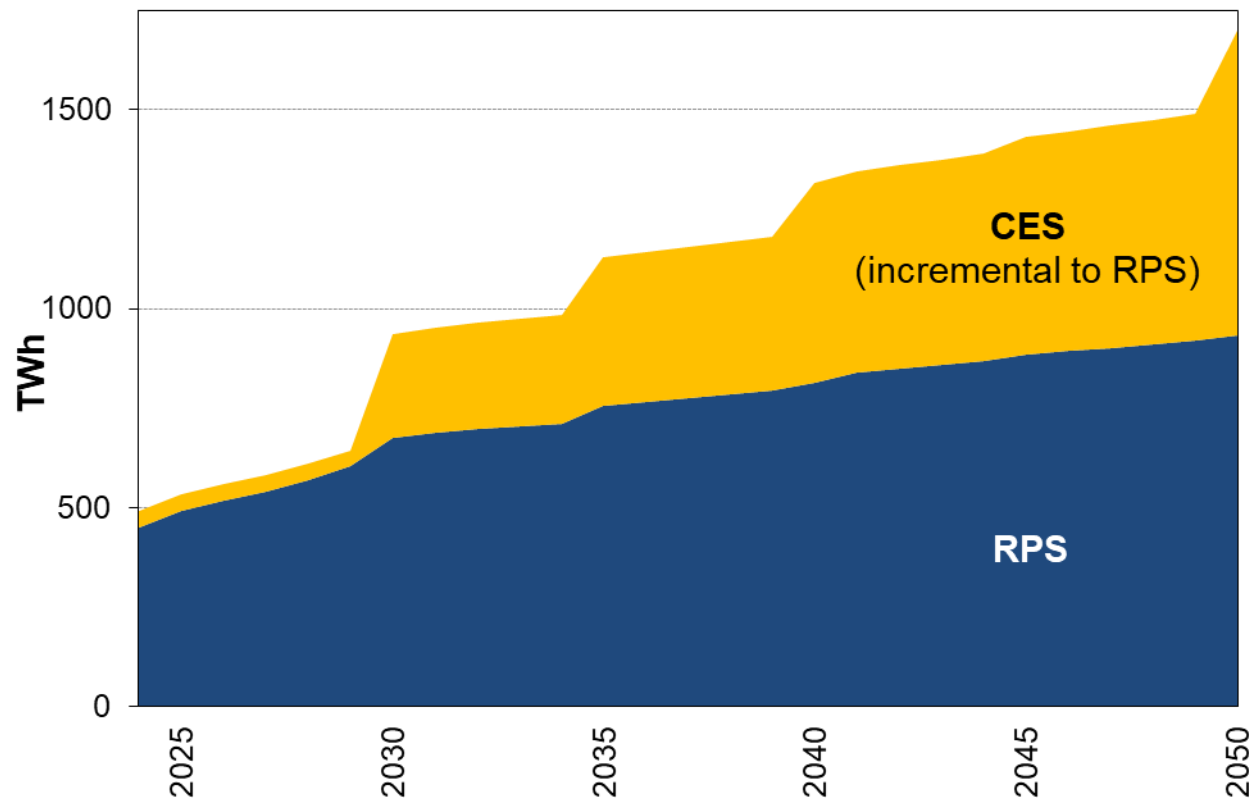
Notes: The figure shows the range of years (post-2020) over which RPS and CES targets ramp up in each state. States without any intermediate year CES targets are shown with a single-year target for the ultimate target year. CES ranges in some states reflect differing target years across applicable LSEs; in WA, the CES range reflects the phase-out in the allowance for unbundled RECs.

- Often a gap between the ultimate RPS target year and the first year of the CES
- Unlike RPS policies, CES targets generally do not ramp up continuously over a period of time
  - ▣ Most CES policies consist of a bookend set of targets for the first and final years, but no defined ramp-up over the intervening years
  - ▣ Other CES policies consist of just a single distant-year target
- CES timelines in individual states sometimes vary across obligated entities (e.g., delayed timelines for smaller or publicly owned utilities)

# Aggregate U.S. RPS and CES Requirements

Grow over time with rising targets and load growth

## Projected RPS + CES Demand



Notes: Projected RPS+CES demand is estimated based on current targets, accounting for exempt load, likely use of credit multipliers, and other state-specific provisions. Underlying retail electricity sales forecasts are based on regional growth rates from the most-recent EIA Annual Energy Outlook reference case.

- Aggregate RPS demand more than doubles from 450 TWh in 2024 to 930 TWh in 2050
- RPS demand growth slows after 2030, as most states pass their maximum percent target
- CES targets pick up that slack, adding 770 TWh of additional clean electricity demand by 2050
  - ▣ Lumpy growth, reflecting staggered targets; corresponding supply growth likely smoother
  - ▣ CES targets may not always be binding in the same manner as RPS policies
- Increase in clean electricity demand does not directly equate to required increase in supply

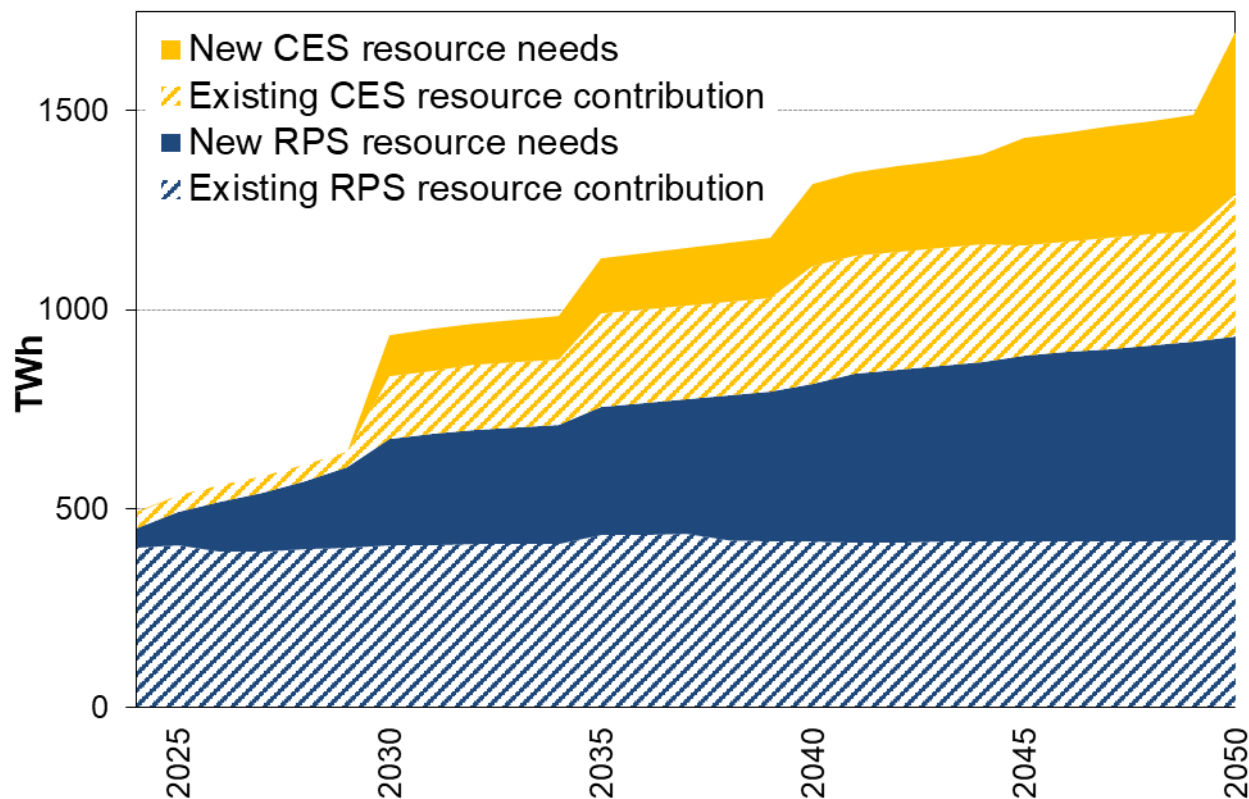
State-level RPS & CES demand projections through 2050 available for download at: [rps.lbl.gov](https://rps.lbl.gov)



# New Resources Needed to Meet RPS+CES Demand Growth

Some of which will be met by resources already under development

## Existing vs. New Resource Contributions to RPS and CES Demand



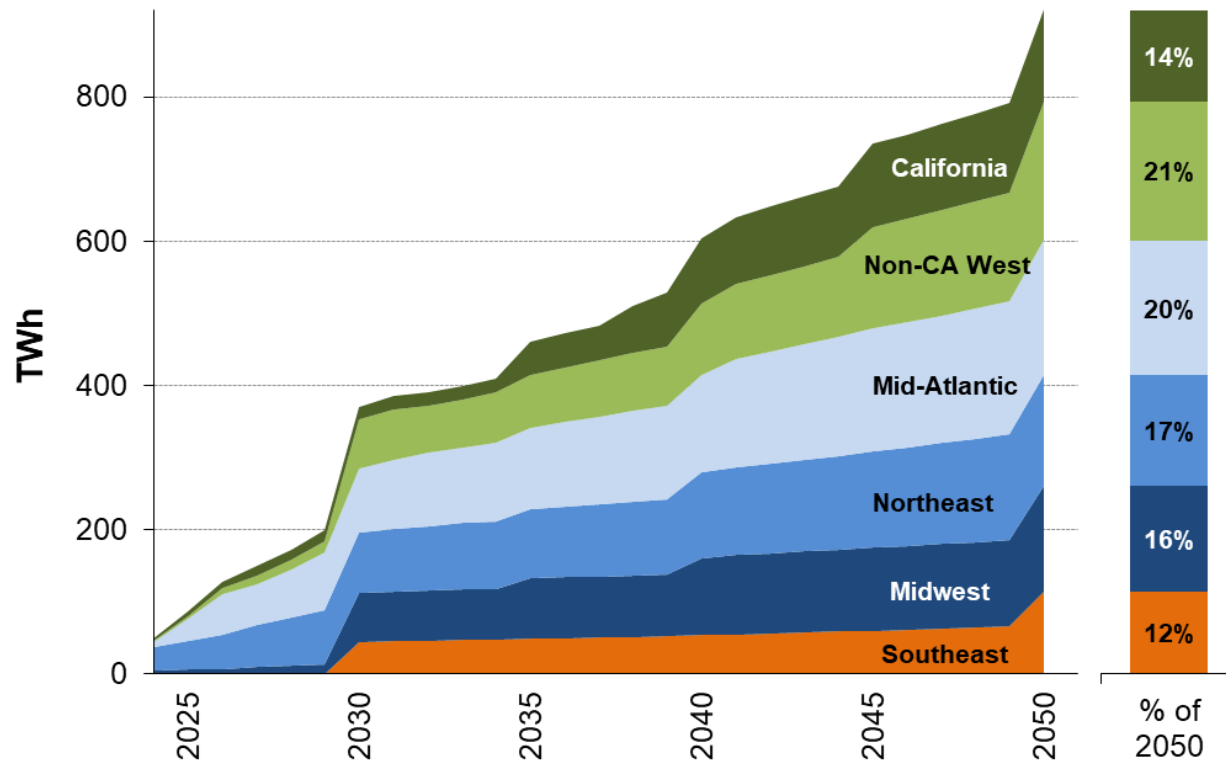
Notes: Existing RPS/CES resources represent the potential contribution to future RPS and CES demand from resources in operation as of year-end 2023, including banked RECs, but without considering future retirements. New resource needs represent the gap between total RPS/CES demand and existing resources.

- RPS demand growth requires a nearly equivalent increase in clean electricity supply
- In contrast, roughly half of CES demand growth could be met with existing resources, primarily nuclear & large hydro (depends on re-licensing)
- Collectively, RPS and CES policies require roughly 350 TWh of new clean electricity supply by 2030 and 900 TWh by 2050 (roughly 3x the historical rate of RPS-buildout)
- Important factors not captured here:
  - ▣ New inter-regional transmission could reduce new resource needs for both RPS and CES
  - ▣ Retirements of existing RPS and CES resources will increase new resource needs
  - ▣ The voluntary market may absorb a larger portion of current RPS-eligible supply than assumed here

# Regional Roundup of New RPS+CES Resource Needs

Varying needs reflect different target trajectories and current resource balance

## New RPS+CES Supply Needs



Notes: See notes on earlier slides about regional definitions and about how new supply needs are determined and defined, which may differ from the definitions used by individual states.

**California:** Minimal new supply needs until the late 2030s, due to current surplus and REC banking; earlier needs could arise depending on how fully IOUs offload surplus to CCAs

**Non-CA West:** Near-term needs driven by 2030 CES targets in OR & WA; longer-term needs reflect rising RPS & CES targets throughout the region (including CO, NV, NM)

**Mid-Atlantic:** Resource needs driven principally by aggressive RPS targets in VA and IL (ComEd) and draw-down on banked RECs throughout the region

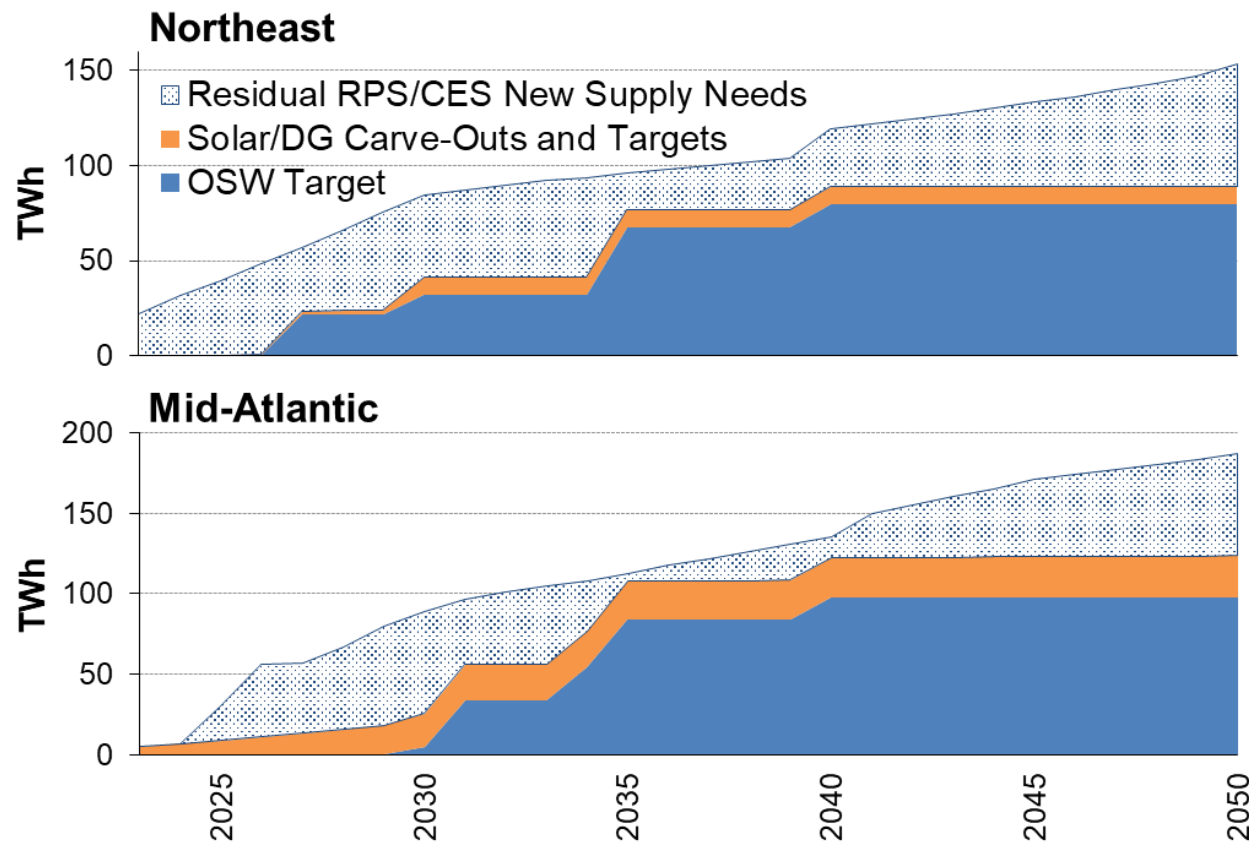
**Northeast:** Near-term needs mostly for NY RPS; longer-term needs also reflect rising RPS/CES targets in New England

**Midwest:** Largest resource needs are for MI RPS/CES, but also significant needs for MN RPS/CES and NE CES

**Southeast:** Consists solely of NC CES, though still a meaningful share of the U.S. 2050 total

# OSW Targets and Solar Carve-Outs Comprise a Large Share of New Supply Needs in the Northeast and Mid-Atlantic

## OSW Target and Solar Carve-Out Contributions to New Supply Needs



Notes: OSW targets translated to TWh assuming 45% capacity factor.

- Numerous states in the Northeast and Mid-Atlantic have established procurement targets for Offshore Wind (OSW)
- Many also have solar and/or DG carve-outs or procurement targets
- A sizeable share of RPS/CES new supply needs may be met by these OSW and solar/DG targets
- Residual new supply need in any given year heavily dependent on the timing of when OSW projects come online
  - ▣ A slow pace in OSW deployment could create large near-term residual supply needs
  - ▣ Possibility of large periodic swings in over/under-supply, REC pricing volatility



# RPS Target Achievement To-Date



# Characterizing RPS Achievement: Key Background Concepts

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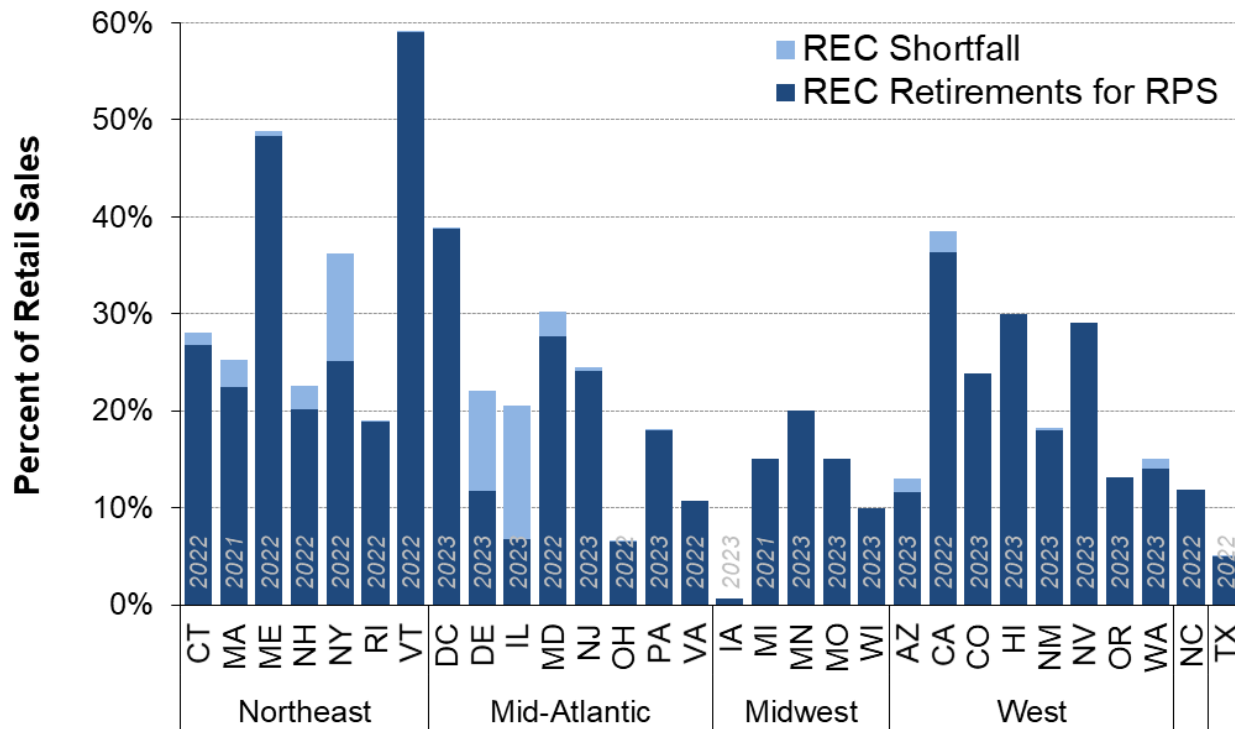
- RPS's typically consist of interim targets that ramp up each year
- Compliance demonstrated through the retirement of RECs
  - Individual LSEs may bank surplus RECs for compliance in future years (so REC or renewable energy procurement may exceed REC retirement)
  - Many states allow LSEs to submit alternative compliance payments (ACPs) in lieu of retiring RECs
  - In other cases, shortfalls must be granted a waiver, made up in future years, or (in rare cases) result in a penalty
- Compliance data typically reported via annual compliance filings by obligated LSEs and/or summary reports prepared by the state PUC
  - Usually a 6-month to 2-year lag in data availability after the end of a compliance year
- We characterize “RPS achievement” in terms of REC retirements relative to RPS obligations
  - Shortfalls for individual states indicate that one or more LSE retired fewer RECs than required; does not necessarily indicate that the state, as a whole, is under-supplied
  - Not equivalent to “compliance”, per se, as ACPs are a form of compliance



# Interim RPS Target Achievement

Most states are on track with their overall RPS targets

## RPS REC Retirements and Shortfalls (most-recent compliance year data)



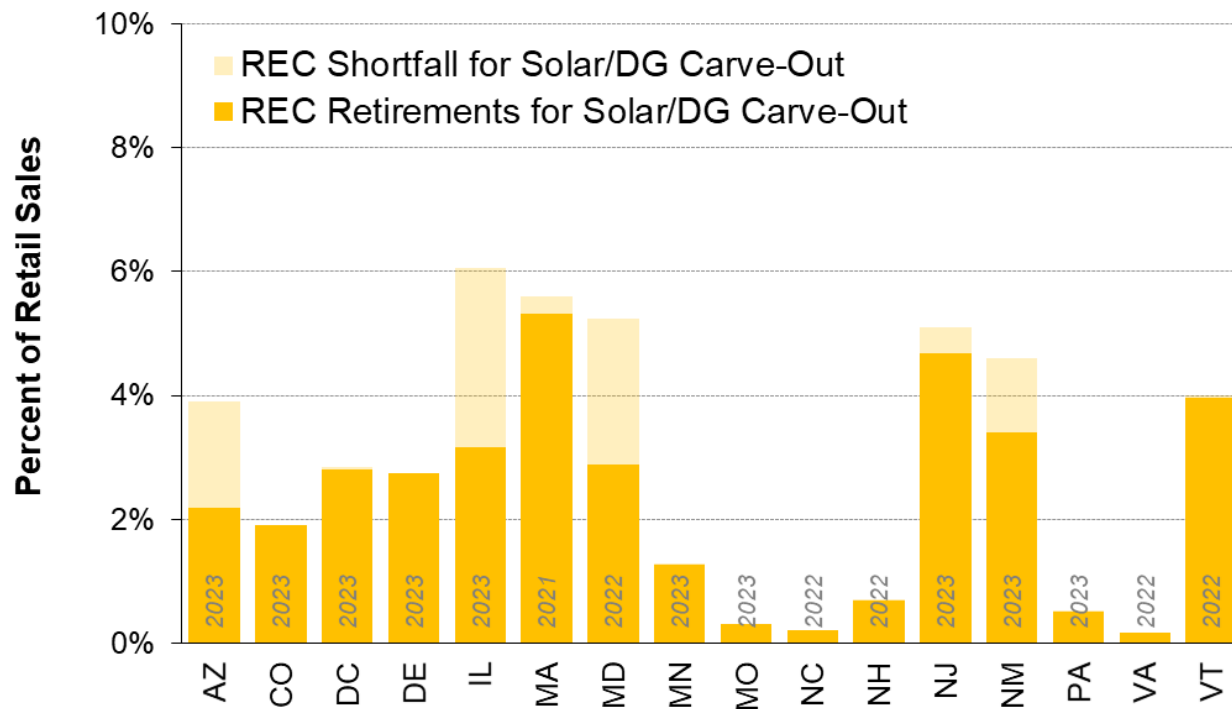
Notes: The compliance year shown for each state is indicated in grey. The height of the stacked bars represents the annual RPS compliance obligation, inclusive of all RPS tiers. In states that allow the use of ACPs, REC shortfalls represent the portion of the target met with ACPs.

- Current RPS targets in the range of 15-30% of retail sales across most states
  - ▣ High targets in ME and VT reflect expansive eligibility rules, including pre-existing large hydro
- Most states are hitting their targets
  - ▣ Small shortfalls are common, often associated with individual LSEs or specific resource tiers
  - ▣ NY and IL: Large shortfalls expected to close as contracted projects come online
  - ▣ DE: Large shortfall due to low ACP compared to other states in the region
- Many states/utilities are well ahead of schedule, while others have met interim targets by relying on stockpiles of banked RECs from prior years

# Interim Solar or DG Carve-Out Achievement

States are generally meeting their carve-out targets

## RPS REC Retirements and Shortfalls (most-recent compliance year data)



Notes: See previous slide for general notes on figure construction. CO data represent the retail DG requirement; IL data represent the new solar procurement requirement; MA data represent the SREC I and SREC II programs; MD data represent carve-out for IOUs and competitive retail suppliers; NM data represent the combined solar and DG diversity requirements; VA data represent Dominion's carve-out for <1 MW DG.

- Current solar and/or DG carve-out targets are typically in the range of 1-5% of retail sales
- Most states have been able to meet these targets, though a few exceptions exist
  - ▣ AZ: Actual installed DG well exceeds target level, but non-incentive systems don't count toward the target
  - ▣ IL: Shortfalls reflect procurement lag, but expected to close
  - ▣ MD: Carve-out target ramped up significantly in recent years, outpacing new in-state solar builds; state has relatively low solar ACP
  - ▣ NM: One utility has received recurring waivers for the solar and DG diversity requirement
- In some cases, solar/DG carve-out shortfalls may be made-up with general RPS resources



# REC Pricing and RPS/CES Compliance Costs





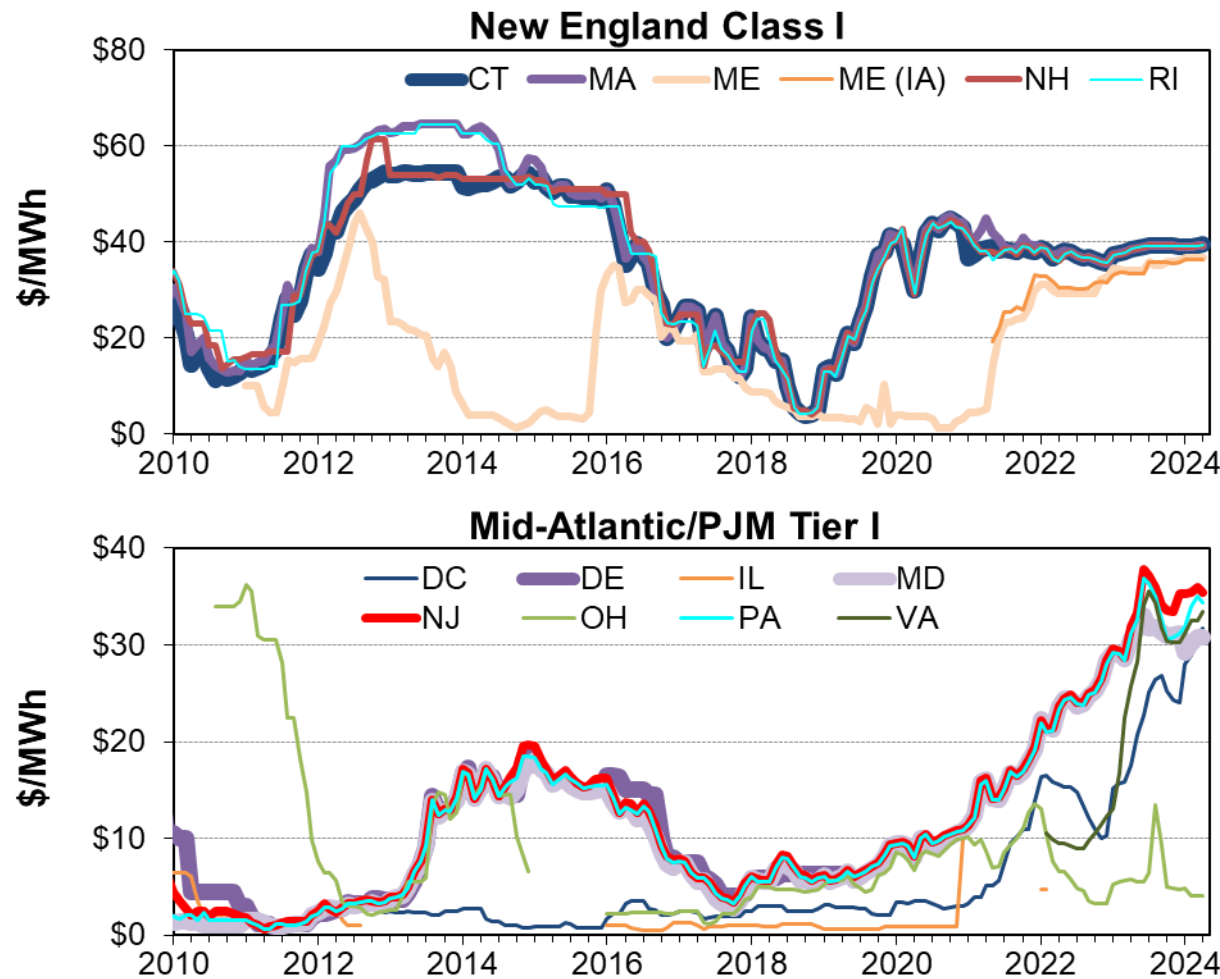
# REC Pricing Fundamentals

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- Spot-market prices a function of current and expected future supply-demand balance and ACP rates
  - ▣ Can be volatile and sensitive to changes in eligibility rules
- Regional markets (e.g., in New England and Mid-Atlantic) form based on common pools of eligible REC supplies
  - ▣ States in those regions with looser eligibility rules have lower prices
- Solar REC (SREC) pricing is highly state-specific due to *de facto* in-state requirements in most states
- The key driver for RPS compliance costs in states that rely heavily on unbundled RECs

# REC Pricing Trends for Primary Tier RPS Obligations

Prices in 2023 have remained at ACP in New England, continued rising in PJM



Source: Marex Spectron. Plotted values are the mid-point of monthly average bid and offer prices for the current or nearest future compliance year traded in each month.

## New England:

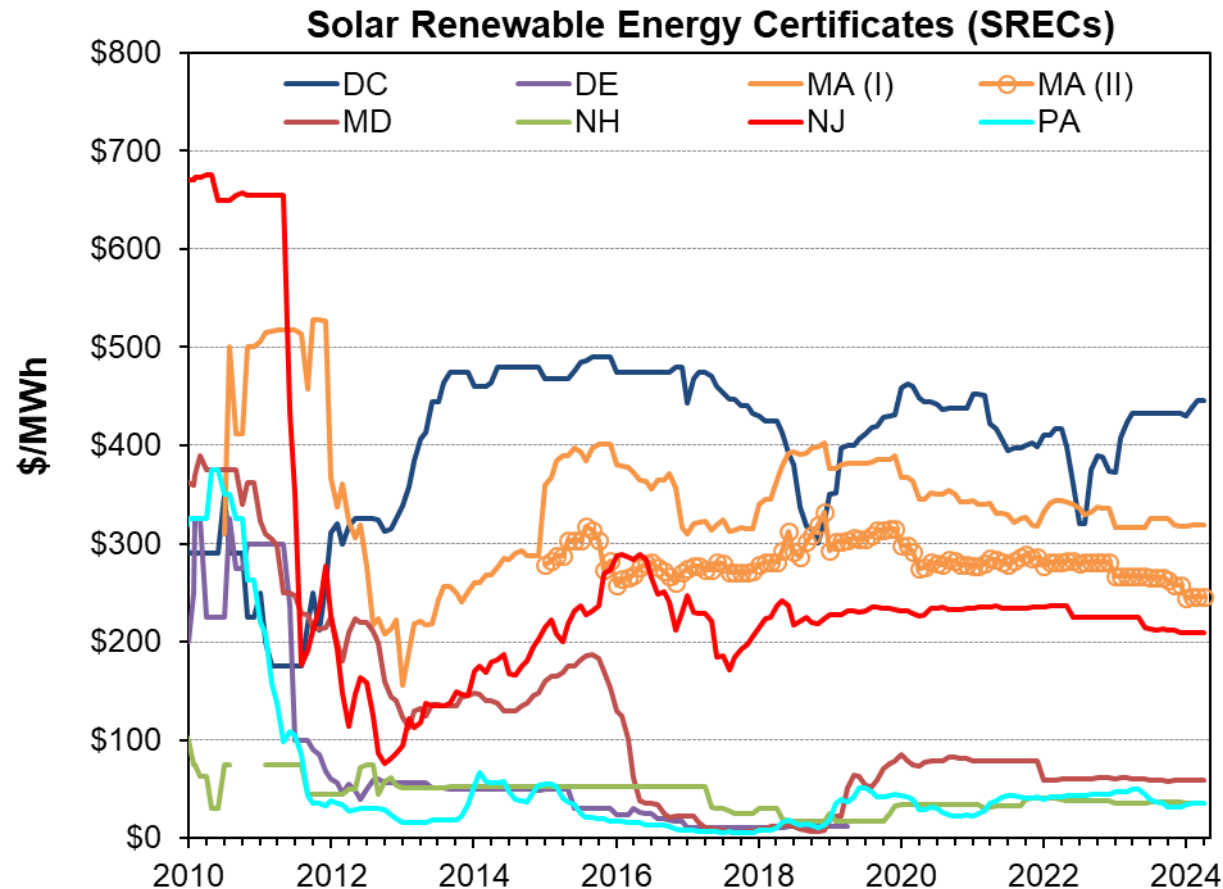
- Pricing relatively stable over the past few years, hovering just below the current MA/CT ACP
- Maine prices were historically lower, due to broader biomass eligibility, but rose as new RE tier (Class IA) ramped up

## Mid-Atlantic/PJM:

- Prices rising steadily as regional RPS targets grow faster than new supply
- Leading to shortfalls in states with low ACP rates (MD and DE), as REC sales shift to states with higher ACPs/REC prices

# SREC Pricing Trends for RPS Solar Carve-Outs

Prices in most states remained flat through 2023



- **DC:** Prices have remained high, due to fundamental challenges of meeting target with in-district resources
- **MA and NJ:** Both states have transitioned away from SREC markets, but SREC pricing for legacy carve-outs has remained relatively high
- **MD:** Prices capped by low solar ACP (\$60/MWh)
- **NH and PA:** modest carve-outs (0.7% and 0.5%, respectively) heavily oversupplied

Source: Marex Spectron. Plotted values are the mid-point of monthly average bid and offer prices for the current or nearest future compliance year traded in each month.

# RPS and CES Compliance Costs

Definition, data sources, and limitations

**Compliance Costs:** Net cost to the load-serving entity (LSE), above and beyond what would have been incurred in the absence of the RPS/CES\*

*Can be measured in terms of different metrics; we summarize costs primarily in terms of a percentage of average retail electricity bills in each RPS/CES state*

## Retail Choice States

- Compliance primarily via unbundled RECs
- We estimate compliance costs based on REC plus ACP expenditures
- Rely wherever possible on PUC-published data on actual REC costs; otherwise use broker spot market prices

## Vertically Integrated States

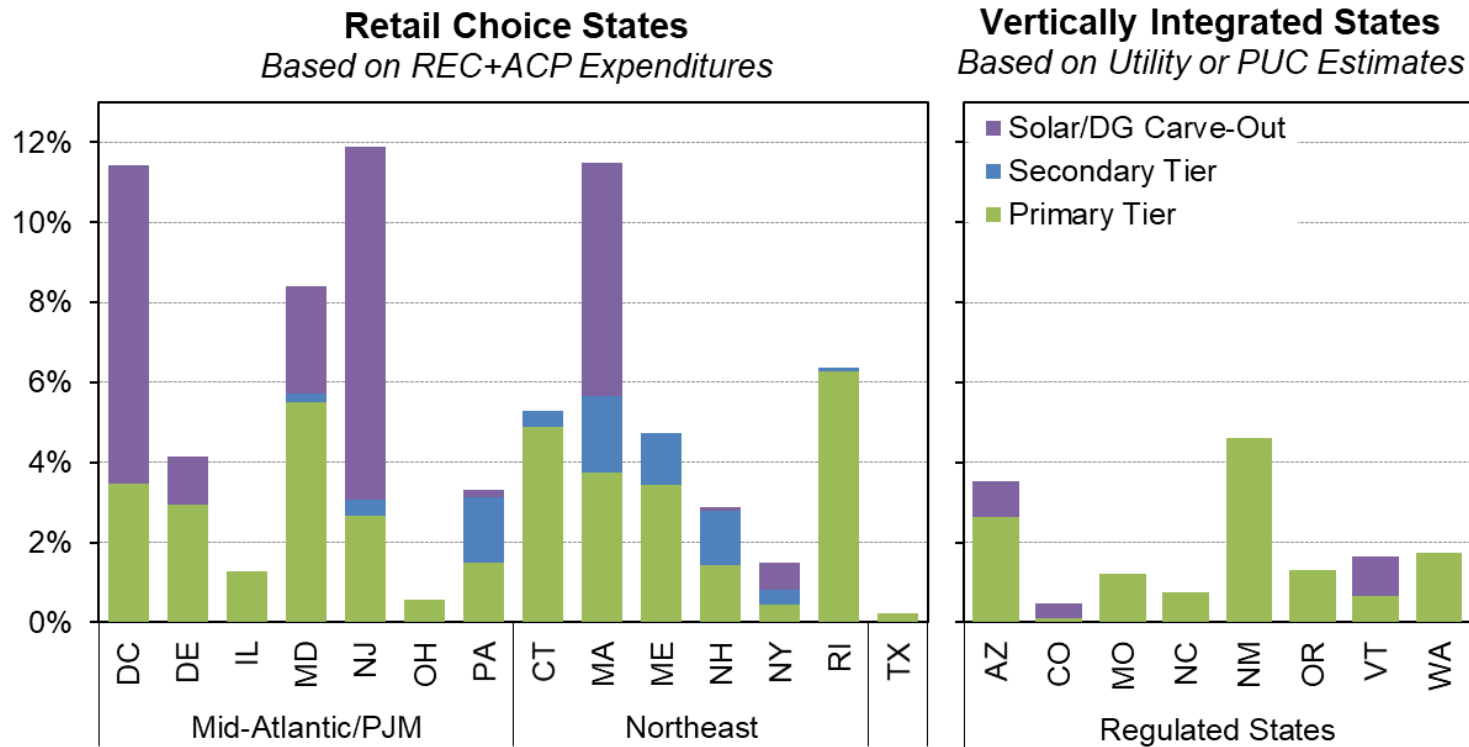
- Compliance primarily via bundled PPAs
- We synthesize available utility and PUC compliance cost estimates, which rely on varying methods
- PUCs/utilities impute compliance costs by comparing gross procurement costs to a counterfactual (e.g., market prices or avoided cost projection)

**\*Key Limitation:** The underlying data and methods used here represent only a partial accounting of the full suite of costs and benefits associated with RPS and CES policies, and are available for only a limited subset of vertically integrated states

# Compliance Costs by Resource Tier

Total compliance costs average ~4% of customer electricity bills but vary widely

## RPS Compliance Costs for Most-Recent Available Year (Percentage of Average Retail Electricity Bill)



Notes: See earlier slide for general explanation of compliance cost estimates. Data for most states are based on either the 2022 or 2023 compliance year. For MA, the solar carve-out includes SREC I and SREC II, and the Primary Tier includes the residual Class I requirement, including SMART, plus the CES. Solar/DG carve-out costs are included in the Primary Tier costs for IL, MO, NC, NM, and OR, as data do not exist to separately break those costs out.

- RPS compliance costs vary across states reflecting differences in policy design, procurement structure, and RE economics
- Highest compliance costs are related to solar carve-outs in states with high SREC prices (though for NJ and MA, these are legacy programs in the process of ramping down)
- Primary tier costs in retail choice states driven by differences in target level and REC pricing
- Secondary-tier costs are generally a marginal contributor, due to low REC prices, though several states are seeing costs on the order of 1-2% of customer bills
- Compliance costs in vertically integrated states are generally lower than in retail choice states, reflecting greater reliance on bundled PPAs

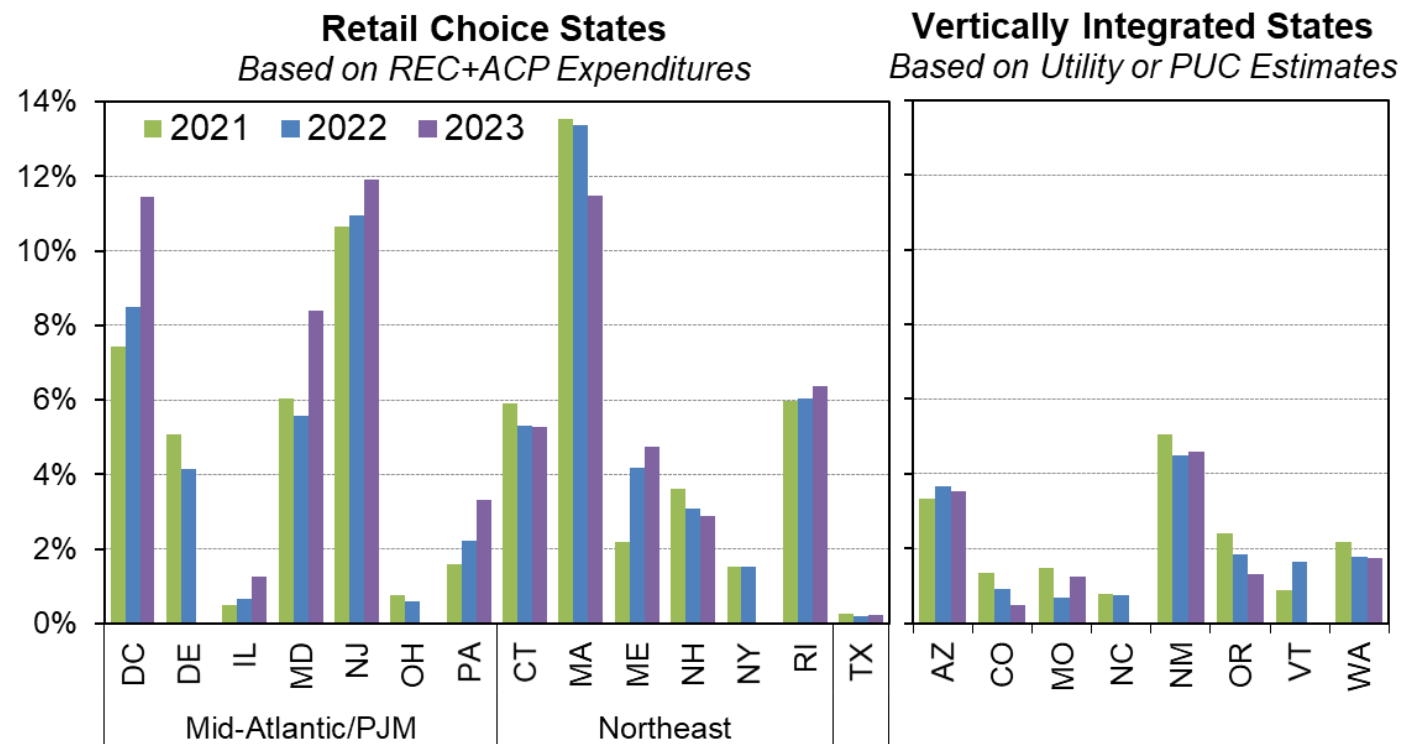


# RPS Compliance Cost Trends (2021-2023)

*Rising in some states while holding steady or declining in others*

## RPS Compliance Costs

*(Percentage of Average Retail Electricity Bill)*



- Time trends driven by underlying trajectories in RPS targets and REC prices and/or PPA prices (most notable in PJM, due to rising Tier 1 REC prices)
- Greater reliance on long-term contracts in vertically integrated (and some retail choice) states mutes YoY changes in compliance costs
- Recent inflationary increases in retail electricity rates dampens RPS compliance costs on a percentage basis

*Notes: See earlier slide for general explanation of compliance cost estimates. For NY, costs are based on NYSERDA expenditures for CES and NY-Sun. For other northeastern states, costs also account for long-term PPAs, where REC costs are imputed based on comparison to wholesale energy and capacity market prices, Compliance cost data are unavailable for states not shown.*



# Outlook



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

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- ➔ Whether additional states decide to increase and extend RPS targets and/or adopt broader CES
- ➔ What kinds of implementation and enforcement mechanisms are ultimately established to meet longer-term CES targets
- ➔ Efficacy of IRA, BIL, and other federal policy in stimulating new clean electricity supplies and transmission
- ➔ Complementary efforts to address RE integration, permitting, and interconnection issues
- ➔ RE cost and REC price trajectories, and the attendant impacts on RPS compliance costs
- ➔ Myriad other RPS policy refinements (e.g., long-term contracting programs, ACP rates, REC banking rules, eligibility rules, etc.)



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## For more information

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