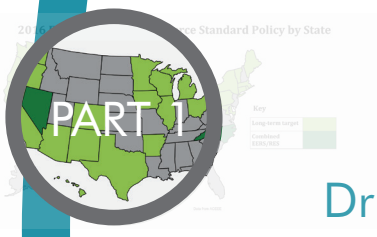
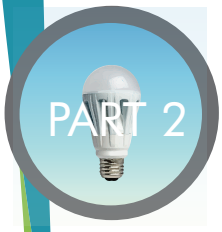
INNOVATION SERIES





PART 3

Driving Renewable Energy Markets: The Conventional Approach

8.25.16

State Renewable Portfolio Standards (RPSs) have been important drivers of renewable energy markets. This third paper in our innovation series examines historical adoption of, and amendments to RPSs, existing market certainty associated with these policies, and the outlook for future market certainty. By 2026, the target dates for 29 state RPS policies will have been reached. This paper offers suggestions for mitigating the potential impacts on market certainty associated with expiring RPSs.

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CENTER FOR THE NEW ENERGY ECONOMY

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About This Series

Since the late 1990s, state Renewable Portfolio Standards (RPS) and Energy Efficiency Resource Standards (EERS) have been the largest drivers of the renewable energy and energy efficiency sectors. However, state target dates are quickly approaching: by 2026, 29 RPS and 11 EERS policies will need to be extended or replaced in order to maintain market certainty for continued investment. In this paper series, the Center for the New Energy Economy analyzes energy efficiency policies (Parts 1 and 2) and renewable energy policies (Parts 3 and 4). Parts 1 and 3 discuss the prospects for extending and enhancing established policies and Parts 2 and 4 propose innovative options that could work with or without an EERS or RPS.

Introduction

Renewable energy resources yield multiple environmental, social, and economic benefits including: reductions in air pollution; decreased water use; job creation and reduced risk. States have long been clean energy policy drivers. While there are many market factors and policies driving growth in the renewable energy sector, since the late 1990s, state renewable portfolio standards (RPSs) have been one of the most important policy tools for supporting this market. Since 2000, more than half of all growth in renewable generation and capacity has been associated with these requirements.[1]

RPSs typically mandate that utilities within a state supply a minimum percentage of their retail electric load with renewable resources like wind and solar. Other states have adopted voluntary goals that encourage utilities in the state to supply a certain amount of renewable energy. The stringency of these policies varies from state to state and this variation impacts the market certainty created by an RPS. As of the publishing of this paper, 37 states had either an RPS or a voluntary goal in place (see Figure 1).

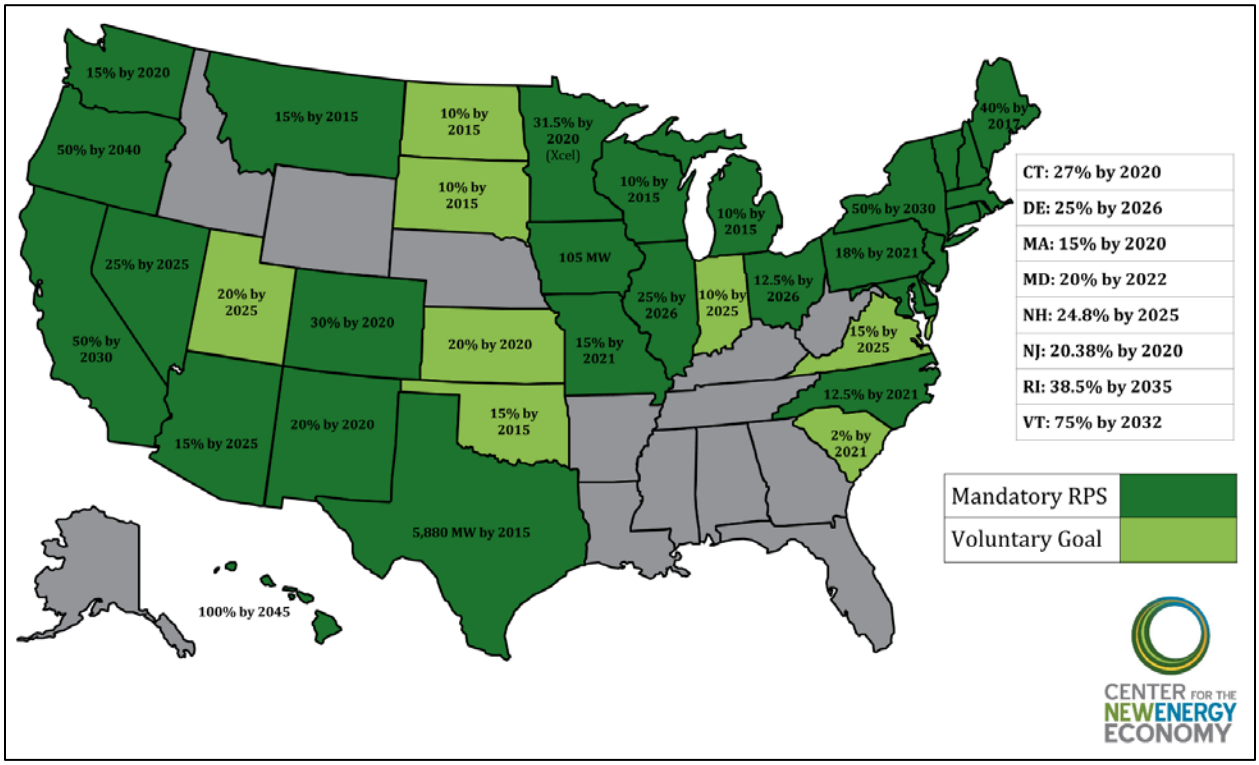

Figure 1. States with an RPS (Source: DSIRE)

[1] Barbose, Galen. *U.S. Renewables Portfolio Standards: 2016 Annual Status Report.*(Berkeley, CA: LBNL,2016) https://emp.lbl.gov/sites/all/files/lbnl-1005057.pdf.

The Current Landscape

In 1983, Iowa became the first state to adopt a renewable energy requirement. More than a decade later, Minnesota became the second state to adopt an RPS and from there, a slow, steady uptake of the policy continued through 2004. Between 2004 and 2008, a rapid adoption of RPSs occurred in 20 states. By 2014, 38 states had adopted either an RPS or a voluntary goal (see Figure 2).

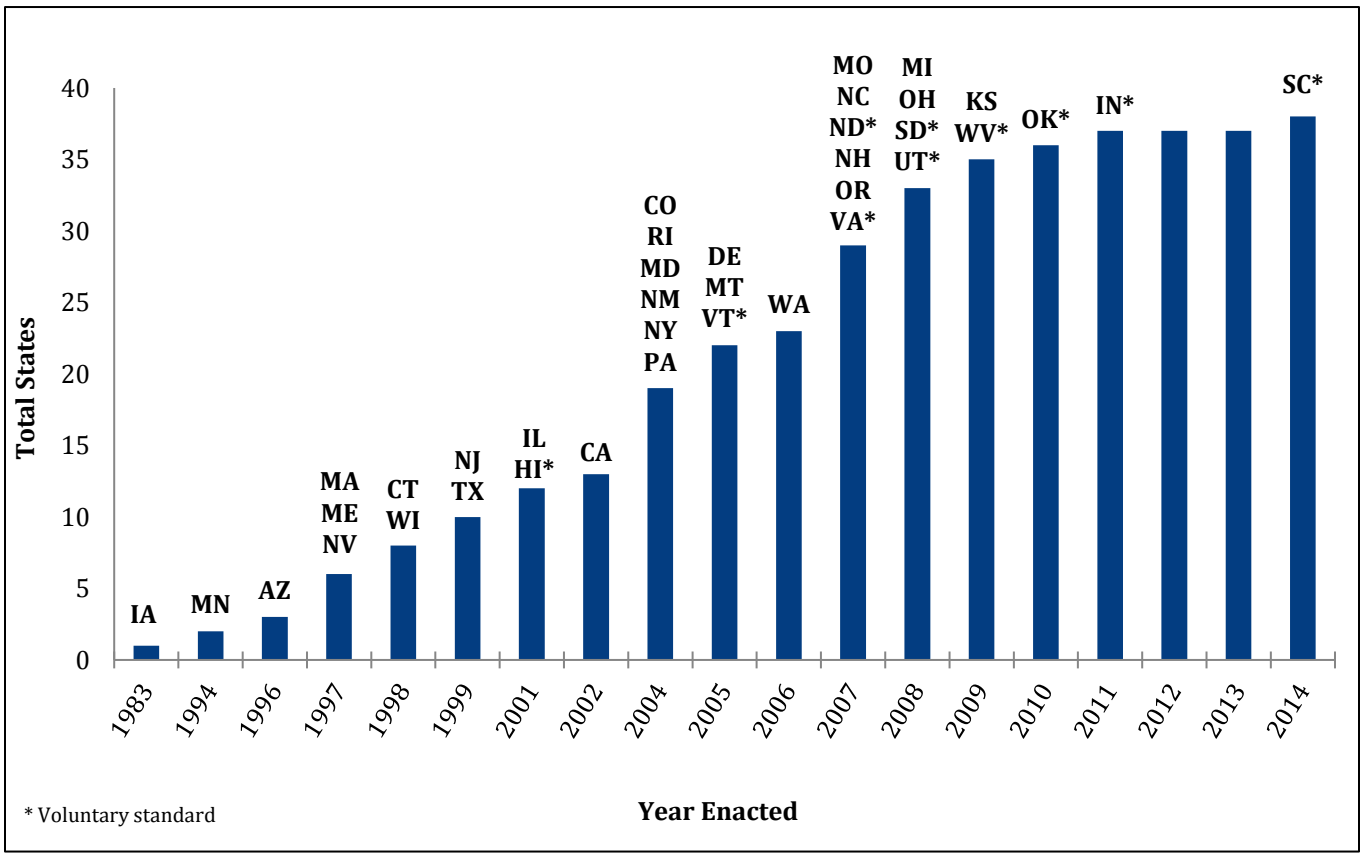

Figure 2. RPS Initial Adoption Dates

RPSs are associated with significant growth in the renewable energy market. According to the Lawrence Berkeley National Laboratory (LBNL), generation associated with RPSs has increased from about 40,000 Gigawatt hours (GWh) in 2005 to 187,000 GWh in 2014 – a 470 percent increase over that span. The market is expected to increase another 240 percent from 2014 through 2035.[2]

[2] Wiser, R.H., Barbose, G.L., Heeter, J., Mai, T., Bird, L., Bolinger, M., Carpenter, A., Heath, G., Keyser, D., Macknick, J., Mills, A., Millstein, D.. *A Retrospective Analysis of the Benefits and Impacts of U.S. Renewable Portfolio Standards.*(Berkeley, CA: LBNL,2016) https://emp.lbl.gov/sites/all/files/lbnl-1003961.pdf.

This demand, though robust, is not spread evenly across the RPS states. By 2035, California's high in-state energy demand and an aggressive RPS will drive 34 percent of all RPS-related demand in the nation. Much of this demand will be met with out of state resources (see Figure 3).[3]

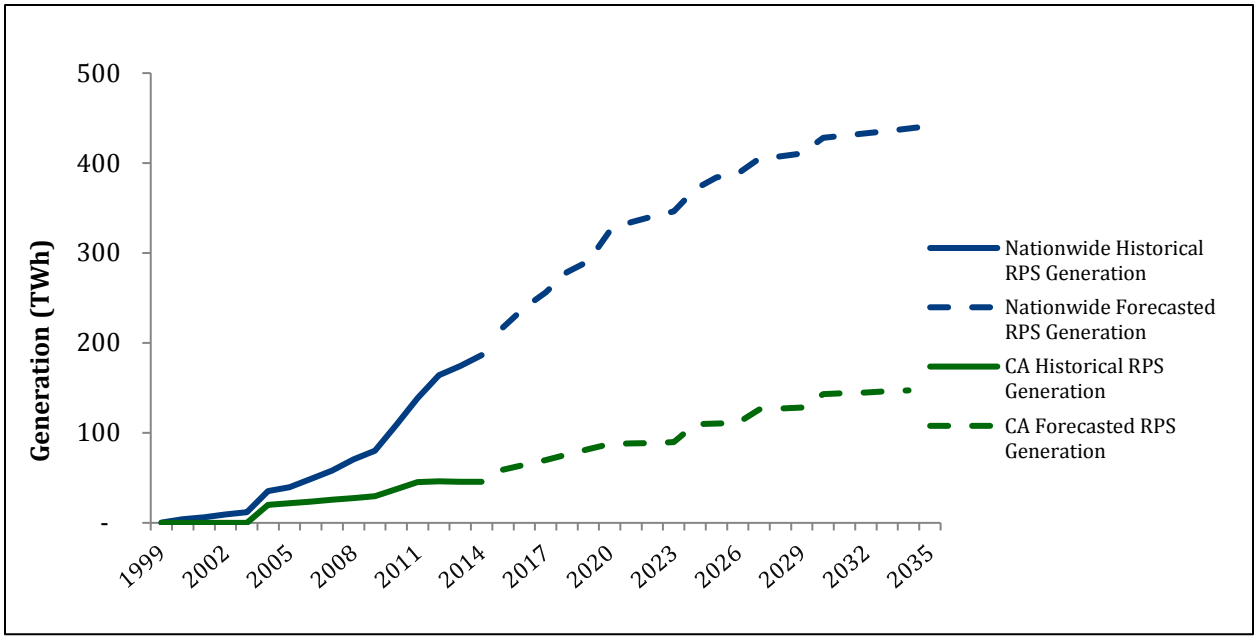

Figure 3. Nationwide Historical and Forecast RPS Generation Demand (Source: LBNL RPS Demand Projections, Feb. 2016)

Because RPSs are key drivers of the renewable energy sector, they are linked to environmental and economic benefits. New renewable resources used to meet RPS compliance obligations in 2013 were associated with the following: 1) a reduction of 59 million metric tons of carbon dioxide-equivalent life-cycle greenhouse gas emissions; 2) reductions in sulfur dioxide, nitrogen oxides, and particulate matter emissions on the order of 77,400, 43,900, and 4,800 metric tons respectively; 3) for each megawatt hour of new renewable resources added in 2013, water withdrawals were reduced by 8,420 gallons; and 4) renewable generation used to meet 2013 obligations and average annual RPS-related capacity additions in 2013 and 2014 supported nearly 200,000 jobs and contributed over $20 billion to the gross domestic product.[4]

[3] See: https://emp.lbl.gov/projects/renewables-portfolio.

[4] Wiser, R.H., Barbose, G.L., Heeter, J., Mai, T., Bird, L., Bolinger, M., Carpenter, A., Heath, G., Keyser, D., Macknick, J., Mills, A., Millstein, D.. *A Retrospective Analysis of the Benefits and Impacts of U.S. Renewable Portfolio Standards*. (Berkeley, CA: LBNL,2016) https://emp.lbl.gov/sites/all/files/lbnl-1003961.pdf.

Why is Market Certainty Important?

Market certainty, in this context, is the level of certainty provided by a policy to market participants. Specifically, when we discuss the levels of market certainty provided by an RPS, we mean that market participants can predict, given existing policy, that demand for new renewable energy resources will continue in the short-, medium-, and long-term.

Uncertainty is bad business. It directly impacts utility and regulatory planning; long-term investments by private sector firms, and it can impact consumers' rates. State policy certainty gives renewable energy developers more confidence that their investments will yield a profitable return. Furthermore, in a race for private sector investment in infrastructure that generates revenue and creates jobs, an uncertain marketplace puts states at a competitive disadvantage with states that have greater market certainty. In the sections that follow, CNEE evaluates the target dates and enabling language of RPSs, places these policies on a spectrum of certainty, and identifies ways to enhance the market certainty associated with these policies.

Future Market Certainty

The LBNL tracks changes to RPSs on an annual basis.[5] While there has been little work on the potential impact on renewable energy market certainty as a result of upcoming target dates, with these target dates approaching, attention may be shifting.

Over the next ten years, RPS target dates will have been reached in 29 states. By 2030, of the 37 states that currently have an RPS, only seven – California, Hawaii, Massachusetts, New York, Oregon, Rhode Island, and Vermont – will continue to have renewable requirements. The concern, from a market certainty perspective, is that target dates may be coupled with a decline in renewable energy demand. This concern is not unfounded. By way of example, historic expirations of the wind energy production tax credit (PTC) have been correlated with significant reductions in wind energy capacity additions.[6]

The recent five-year extensions of the wind energy PTC and the solar investment tax incentive (ITC) through 2019 and 2021, respectively, could mitigate market declines.[7] Though these tax credits offer cost certainty for developers and utilities, they do not mandate that utilities purchase the generation that leverages these tax credits. In addition, it is possible that local transmission constraints and intermittency concerns could limit or reduce the economic advantage of wind and

[5] See: https://emp.lbl.gov/projects/renewables-portfolio.

[6] Mai, T., Cole, W., Lantz, E., Marcy, C. and Sigrin, B. *Impacts of Federal Tax Credit Extensions on Renewable Deployment and Power Sector Emissions*. (Golden, CO: NREL, 2016). http://www.nrel.gov/docs/fy16osti/65571.pdf. And Wiser, R. and Bolinger, M. *2014 Wind Technology Market Report*. (Washington DC: DOE, 2015) http://energy.gov/sites/prod/files/2015/08/f25/2014-Wind-Technologies-Market-Report-8.7.pdf.

[7] For more information on the tax credits see: http://energy.gov/savings/renewable-electricity-production-tax-credit-ptc for the wind energy PTC and http://energy.gov/savings/business-energy-investment-tax-credit-itc for the solar ITC.

solar even with this tax credit.[8] In contrast, RPSs effectively require that utilities procure renewable energy regardless of these potential limitations, offering the certainty that there will be a set demand for prospective developers. Thus, despite the extension of the PTC and ITC, the approaching RPS target dates could cloud the future outlook for the renewable market, especially in the medium (2020 – 2026) term (see Figure 4).[9]

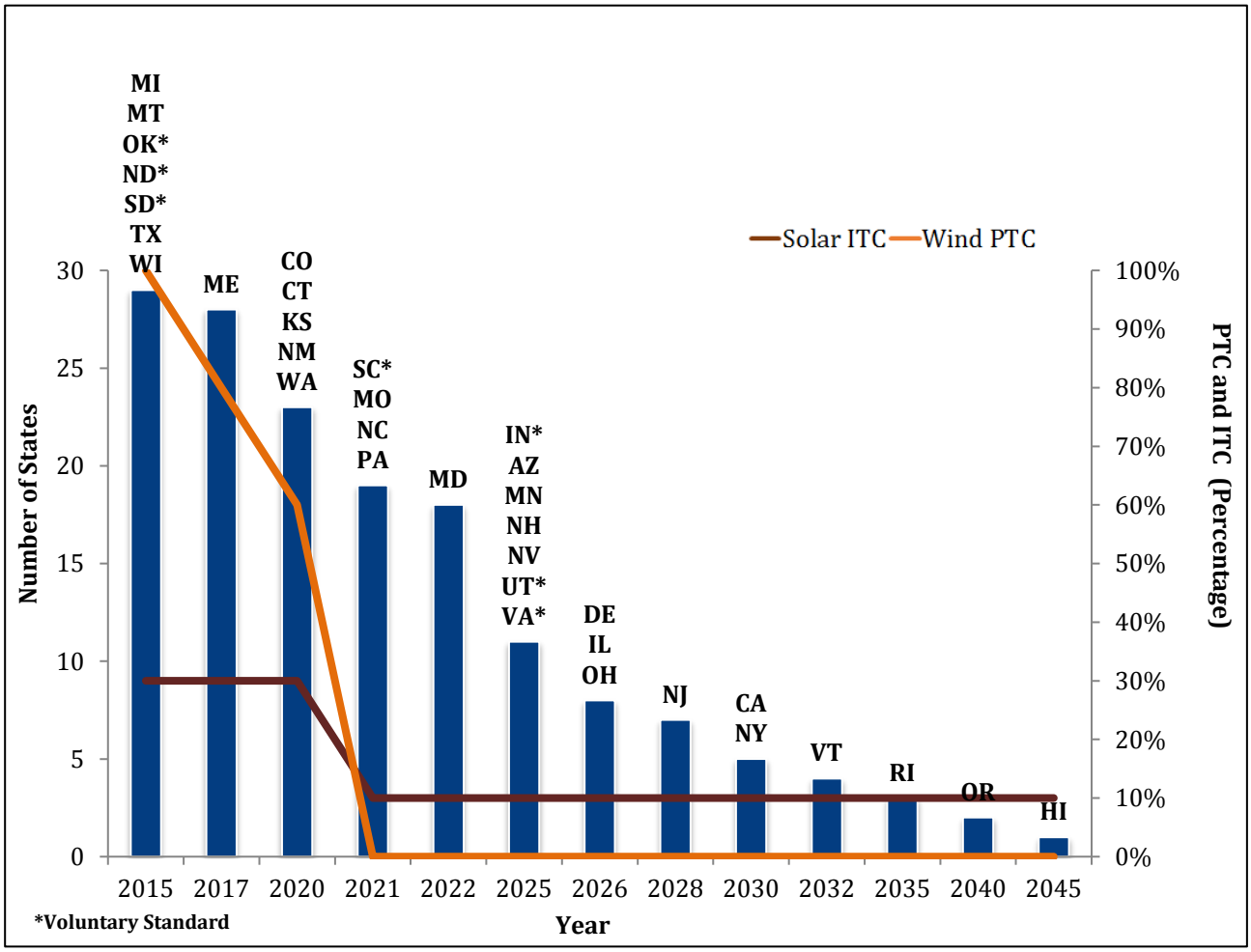

Figure 4. RPS Target Dates and ITC / PTC Schedules

[8] See: https://www.wecc.biz/_layouts/15/WopiFrame.aspx?sourcedoc=/Reliability/2015-Integrated-Transmission-and-Reliability-Assessment-Draft.docx&action=default&DefaultItemOpen=1.

[9] Mai et al. (2016) suggest that by 2030, market demand for renewable energy resources may be driven largely by the cost competitive nature of these resources, assuming cost declines for both wind and solar photovoltaics are achieved.

Recent Legislative Trends

CNEE has tracked RPS-related policy changes in our Advanced Energy Legislation Tracker (AEL Tracker) database since 2013. In the last four years, a total of 362 RPS-related bills have been introduced around the country. Of these, 57 have been enacted, and most made modifications to existing standards without increasing targets (see Figure 5). Of the significant changes made in the last two years, West Virginia[10] and Kansas rolled back their standards, and California, Hawaii, New York, Oregon, Rhode Island, and Vermont adopted significant expansions of their policies. While many states have revised their RPSs, most states have not enacted legislation to extend and increase their standards.[11]

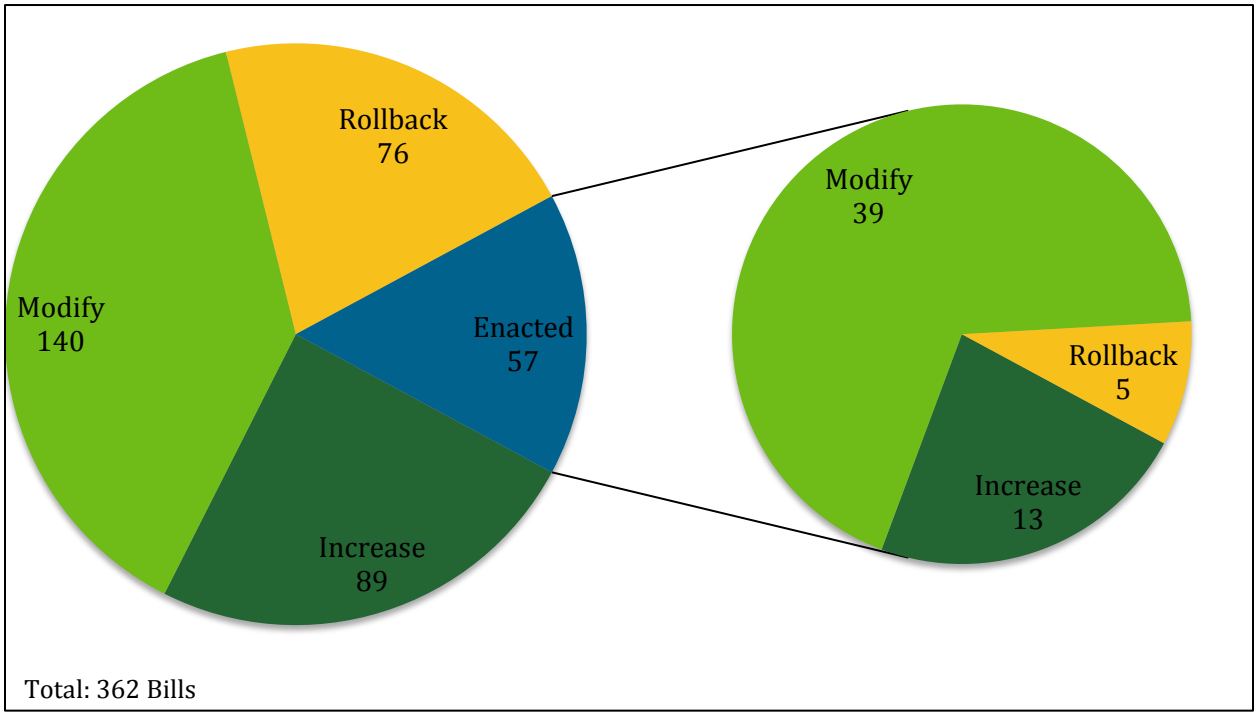

Figure 5. Introduced and Enacted RPS Legislation 2013 -2016

Existing Market Certainty

The extent to which approaching targets will impact market certainty in a state is largely dependent upon the underlying authorizing language.[12] For example, a state with a mandatory RPS with defined interim and final savings targets creates more market certainty than a state with a voluntary goal. To demonstrate the wide range in market certainty provided by these policies,

[10] West Virginia's RPS included non-renewable resources such as coal and natural gas.

[11] For more on legislative activity and RPSs, see: http://www.aeltracker.org/p/trends-analysis.

[12] Authorizing language is provided in the appendix.

Figure 6 orders RPS states across five market certainty categories and denotes the stringency of each standard.[13]

An additional RPS design element that can impact market certainty is the inclusion of non-renewable and large-scale hydroelectric resources. In states with RPSs that do not create a separate tier or set-aside for storage resources like pumped hydro-storage or fuel cells, or that allow energy efficiency, or combined heat and power systems fueled by fossil fuels to be eligible for a portion of the renewable requirement, the renewable energy sector may face an uncertain future. Specifically, while an RPS designed in this manner may encourage some development of new renewable resources, it also requires these new resources to compete with existing technologies. This can create uncertainty for renewable energy investors and have the effect of reducing the overall percentage of capacity provided by renewable resources.

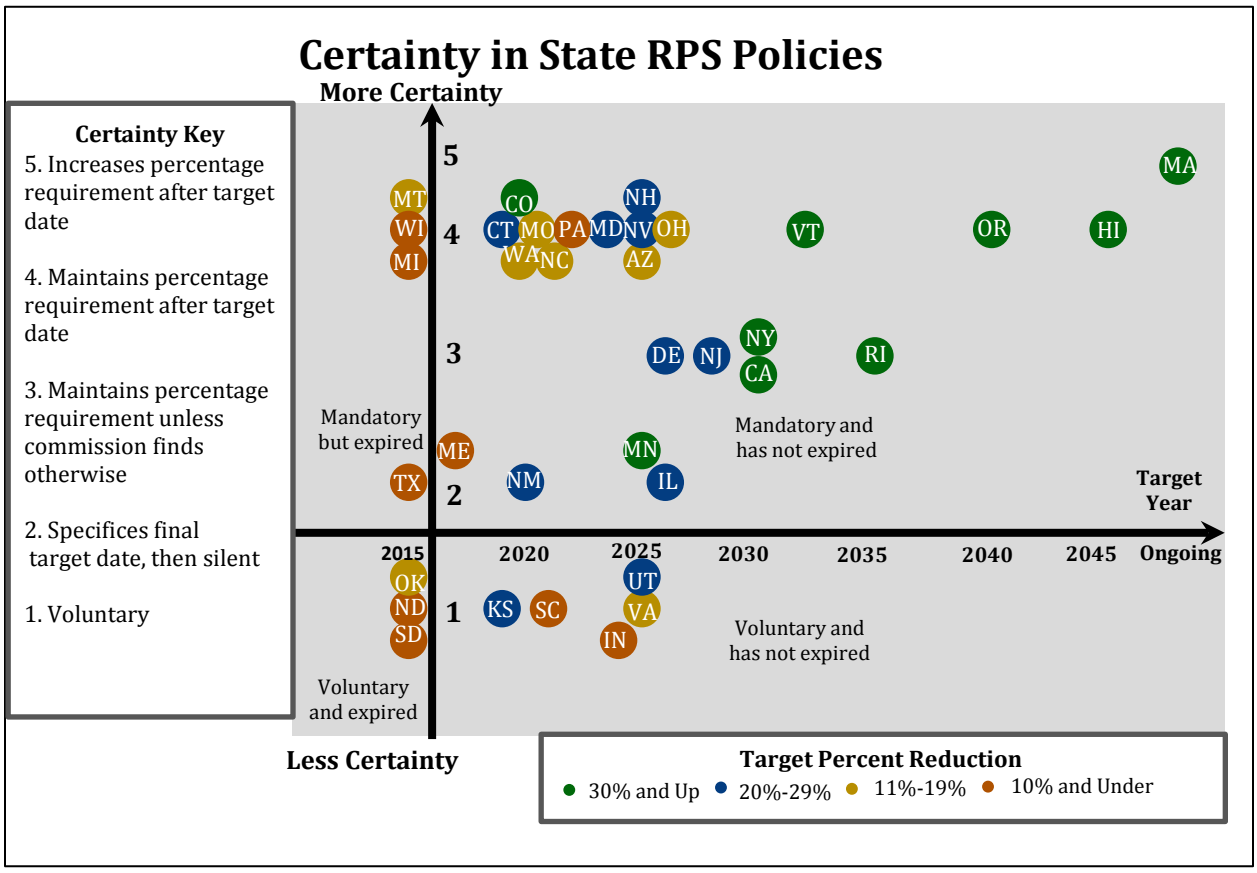

Figure 6. Market Certainty across State RPSs

[13] Maine is categorized according to new renewable resources that will be required to meet the RPS. Pennsylvania is categorized according to its renewable Tier I resources.

Table: Market Certainty in RPSs

Certainty level 5. Authorizing language increases renewable requirement continuously	Only Massachusetts requires continuous annual improvement in renewable energy targets. With a standard set at an additional 1% per year, Massachusetts' RPS requires that retail suppliers meet a 15% by 2020 target, and a 30% by 2035 target. This structure instills strong market certainty by confirming that a market will continue in perpetuity.
Certainty level 4. Authorizing language maintains the percentage requirement after target date	Seventeen states require that the final target be maintained after the target date. While this provides market certainty for utility planning, it provides less certainty for renewable energy developers as expansion of the market is not guaranteed.
Certainty level 3. Authorizing language maintains percentage requirement unless commission finds otherwise	Five states (California, Delaware, New Jersey, New York, and Rhode Island) allow public utility commissions (PUCs) to adjust targets after the final target date set by statute. Allowing targets to be set by PUC discretion can create significant market uncertainty as changes in PUC priorities may mean either an increase or a decrease in requirements. However, of the five states listed here, only Rhode Island allows its commission to decrease standards. In the other four states, statute sets a floor that must be maintained, but can be increased by a PUC. In these four states, statute provides greater market certainty for developers than does the Rhode Island Statute.
Certainty level 2. Authorizing language specifies final target and date, then silent	Five states (Illinois, Maine, Minnesota, New Mexico, and Texas) simply set a final target and date. This structure creates strong market certainty until the target date, after which market certainty may decline.
Certainty level 1. Voluntary standard	Four states have established voluntary, non-binding renewable energy targets. While these states are given the lowest certainty score, their policies may promote more renewable development than those states that have never had either a goal or an RPS.

Policy Recommendations for Strengthening RPS Market Certainty

In summary, while RPS policies increase market certainty, they fall on a spectrum. Certainty can be influenced by a handful of key policy components that we describe above. To increase market certainty for renewable energy investments, policy makers should consider one or more of the following policy options:

- Mandate achievement of existing goals, or create new mandatory targets (for states with a voluntary goal or with no enabling policy).
- Define eligible resources as those that are truly renewable.
- Accelerate savings targets by requiring that targets be met earlier. (This may be especially important to ensure that developers can capitalize on the current schedule for the Production and Investment Tax Credits.)
- Increase renewable energy percentage requirements.
- Set a target that increases each year, in perpetuity.
- Amend existing statute to include a "thereafter clause" following the target year.

Adopting or implementing an RPS is not the only way to advance renewable energy market certainty within a state. Paper 4 in this series examines pathways to integrate corporate renewable goals into the regulatory planning process.

Appendix: Authorizing Language - State RPSs

State	Adoption Date	Enabling Authority	Target Date
Arizona	1996	AAC R14-2-1801 et seq.	2025
California	2002	CA Public Utilities Code § 399.11 et seq.	2030
Colorado	2004	CRS 40-2-124	2020
Connecticut	1998	CT Gen. Stat. § 16-245a et seq.	2020
Delaware	2005	26 Del. C. § 351 et seq.	2026
Hawaii	2001	HRS § 269-91 et seq.	2045
Illinois	2001	20 ILCS 3855/1-75	2026
Indiana	2011	IC 8-1-37	2025
Iowa	1983	IA Code § 476.41 et seq.	1999
Kansas	2009	KS Statutes 66-1256 et seq.	2020
Maine	1997	35-A M.R.S. § 3210	2017
Maryland	2004	MD Public Utilities Code § 7-701 et seq.	2022
Massachusetts	1997	M.G.L Ch. 25A § 11F	Ongoing
Michigan	2008	MCL § 460.1001 et seq.	2015
Minnesota	1994	MN Stat. § 216B.1691	2025
Missouri	2007	R.S.M.O. § 393.1020 et seq.	2021
Montana	2005	MCA 69-3-2001 et seq.	2015
Nevada	1997	NRS 704.7801 et seq.	2025
New Hampshire	2007	NH Statutes Chapter 362-F	2025
New Jersey	1999	NJ Statutes § 48:3-49 et seq.	2028
New Mexico	2004	NM Statute § 62-16-1 et seq.	2020
New York	2004	NY PSC Order in Case No. 15-E-0302	2030
North Carolina	2007	NC Gen. Stat. § 62-133.8	2021
North Dakota	2007	ND Century Code § 49-02-24 et seq.	2015
Ohio	2008	ORC 4928.64 et seq.	2026
Oklahoma	2010	OK Statutes § 801.1 et seq.	2015
Oregon	2007	ORS Ch. 469A	2040
Pennsylvania	2004	PA Code § 75.61 et seq.	2021
Rhode Island	2004	RI General Laws § 39-26-1 et seq.	2035
South Carolina	2014	SC Code of Laws § 58-39-110 et seq.	2021
South Dakota	2008	SDCL § 49-34A-101 et seq.	2015
Texas	1999	TX Utilities Code § 39.904	2015
Utah	2008	UT Code § 54-17-601 et seq.	2025
Vermont	2005	30 V.S.A. § 8005	2032
Virginia	2007	VA Code § 56-585.2	2025
Washington	2006	RCW 19.285	2020
West Virginia	2009	WV Code § 24-2F-1 et seq.	Repealed
Wisconsin	1998	WI Statutes § 196.378	2015