US PREF
U.S. Partnership for Renewable Energy Finance

SUMMARY

Ramping up Renewables: Leveraging State RPS Programs amid Uncertain Federal Support

Executive Summary

- America now generates more kilowatt-hours of renewable energy than any other country in the world. In addition to creating jobs and bettering the environment, zero-fuel cost renewable generation provides a critical hedge against future increases in fossil fuel prices. Having been *growing robustly for over a decade, however, renewable energy in America now faces some major headwinds*.

- While federal incentives such as the Production and Investment Tax Credits have bolstered the *supply* of renewable energy, support for renewable energy *demand* has come chiefly from states in the form of Renewable Portfolio Standard (RPS) mandates for utilities to procure minimum amounts of electricity from renewables sources. Currently in place in 29 states (and Washington DC), RPS mandates have driven creation of 1/3 of current US non-hydro renewable electricity.

- Curtailment of federal incentives would leave RPS mandates as the chief medium-term driver of new investment in renewable energy. This paper finds, however, that annual new renewable generating capacity needed to meet RPS mandates through 2030 amounts to 3.25 gigawatts (GW) – for 61.5 GW of new generating capacity in total; this level of "RPS demand pull" is slightly below its average level for 2008-2011 and is equal to only roughly 1/3 of total new US renewable generating capacity in 2011 (9 GW) - which was supported on the supply side by federal incentives. Hence, *going forward RPS programs will continue to make a valuable but limited contribution to deployment of new renewable generating capacity in the US*.

- Increasing cost-competitiveness with conventional generating capacity and remaining incentives should enable continued deployment of renewables in line with "RPS demand pull." Without new or expanded RPS targets, however, RPS-driven demand will level off – suggesting that policy support for investment in renewable energy will be *stagnating* just as America's need for the energy diversity and security benefits of renewable energy is *increasing* (due to investment in new gas-fired generation and rising exposure to volatile fossil fuel prices).

- To diversify America's energy mix and hedge against uncertainty in the price of fossil fuels (in particular natural gas), state policymakers can increase long-term support for renewable energy demand. Measures such as strengthening existing RPS targets, procuring more renewable electricity from large-scale projects through reverse auctions, and introducing additional incentives such as CLEAN (Clean Local Energy Accessible Now) programs, feed-in tariffs, and performance-based incentive rebates can increase such support for renewable energy. Provided that they protect the energy diversity benefits of distributed generation, policies to broaden interstate trade in Renewable Energy Credits (RECs) may be another option to consider.

- Sustaining robust deployment of renewables will also require access to capital to support the required level of private investment. Particularly given recent stresses in financial markets, existing tax policies are essential to support new investment in the renewable energy sector. In

the shorter term, those policies include the Production Tax Credit and Investment Tax Credit.[1] Going forward, consideration can be given to how to best *coordinate transitional, supply-focused federal tax incentives with longer-term, demand-focused RPS programs as part of an integrated renewable energy strategy for America.*

Introduction – Diversified and hedged energy system

Renewable energy in the US has been booming. In 2011 the US generated nearly 5 percent of its electricity from non-hydro renewable sources – up from less than 2 percent in 2001.[2] Over the last decade the number of states generating more than 5 percent of their electricity from non-hydro renewable sources has quadrupled – from five states in 2001 to 20 states in 2011. As a result of this growth, in absolute terms the US now leads the world in generation of electricity from non-hydro renewable sources.[3] Over just the past five years, deployment of renewable generating technologies has attracted over $100 billion of new investment.[4] Increased US deployment has helped to accelerate dramatic reductions in the cost of solar PV and other renewable generation technologies.

The benefits of deploying renewable energy sources include jobs for American workers[5], a cleaner and healthier environment, and, especially – by reducing exposure to volatile fossil fuel prices - a more diverse and secure US energy supply. **Key facts about the US power sector make the energy security dimension of renewable energy particularly valuable. America now generates roughly 65% of its electricity from coal and natural gas.[6] Dependence of the US power sector on fossil fuels will continue as a result of America's latest "dash to gas" – over half of planned new electricity generating capacity through 2015 is gas-fired.[7] Because fuel accounts for more than 50% of the cost of electricity from coal and gas-fired generation,[8] these investments risk increasing America's vulnerability to fuel-price shocks just as new sources of demand (from the industrial, transportation, and export sectors) threaten to ratchet the price of natural gas upward.** By diminishing the need for new fossil generation, deploying low to zero-fuel cost renewable resources provides a hedge against future increases in the price of fossil fuels.[9] *Hedging against fossil fuel price shocks is a compelling reason to ensure sustained*

[1] The Production Tax Credit is set to expire at year-end 2012. For more discussion, see our companion US PREF paper "Clean Energy and Tax Reform."

[2] Non-hydro renewable sources include wind power, solar PV, solar thermal, biomass, and geothermal. US Energy Information Administration (EIA), *Electric Power Annual* and *Electric Power Monthly,* March 2012, based on preliminary 2011 data.

[3] The US produces about 70% more than Germany, the next largest non-hydro renewable electricity producer. EIA, http://www.eia.gov/energy_in_brief/renewable_electricity.cfm, May 2012.

[4] Bloomberg New Energy Finance (BNEF), May 2012.

[5] See DB Climate Change Advisers paper, "Repowering America: Creating Jobs," October 10, 2011, http://www.dbcca.com/dbcca/EN/investment-research/investment_research_2396.jsp

[6] EIA, Form EIA-906, *Power Plant Report*, March 2012.

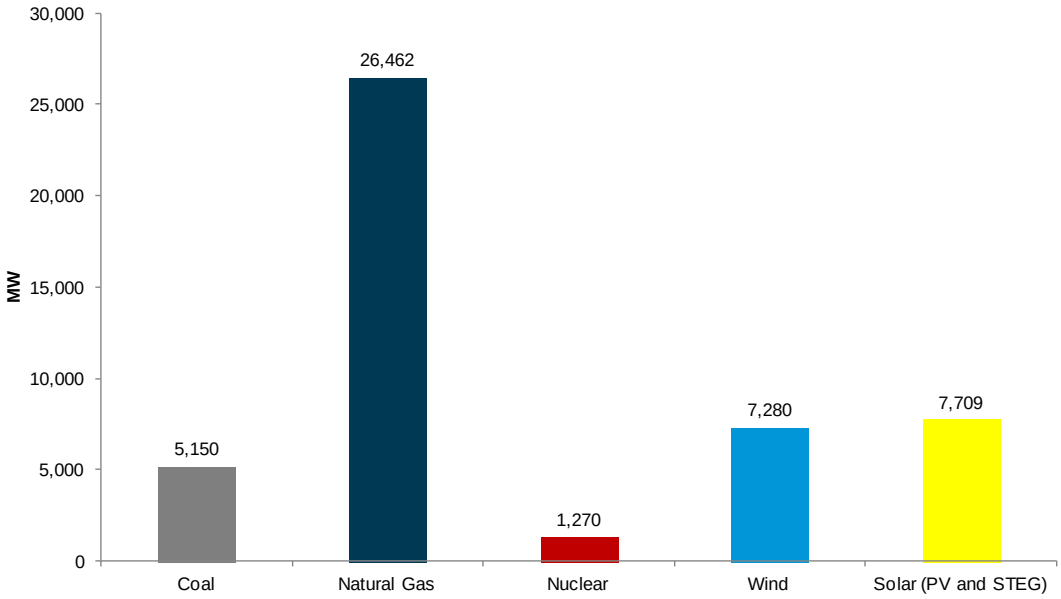
[7] This is largely because the capital costs of new gas-fired combined-cycle units are 30-50% lower than those of new coal-fired units. For comparison of the economics of new gas and coal-fired units, see DB Climate Change Advisers paper, "Natural Gas and Renewables: the Coal to Gas and Renewables Switch is on!," October 10, 2011, http://www.dbcca.com/dbcca/EN/investment-research/investment_research_2395.jsp

[8] According to the Lazard Capital Markets' June 2012 *Levelized Cost of Energy Model 6.0*, fuel accounts for 51% of the levelized cost of energy from a coal-fired plant and 66% of the levelized cost of energy from a combined-cycle natural gas plant – versus 0% for solar and wind power generating plant.

[9] For more detail, see R. Wiser et al., "The Hedge Value of Renewable Energy", Lawrence Berkeley National Laboratory, 2004.

investment in developing domestic renewable energy sources.[10] Moreover, the decline in the costs of renewable energy technologies continues to enlarge the scope of feasible near-term investment in US renewable energy.

Figure 1 Planned Generating Capacity Additions from New Generators by Energy Source, 2012-2015



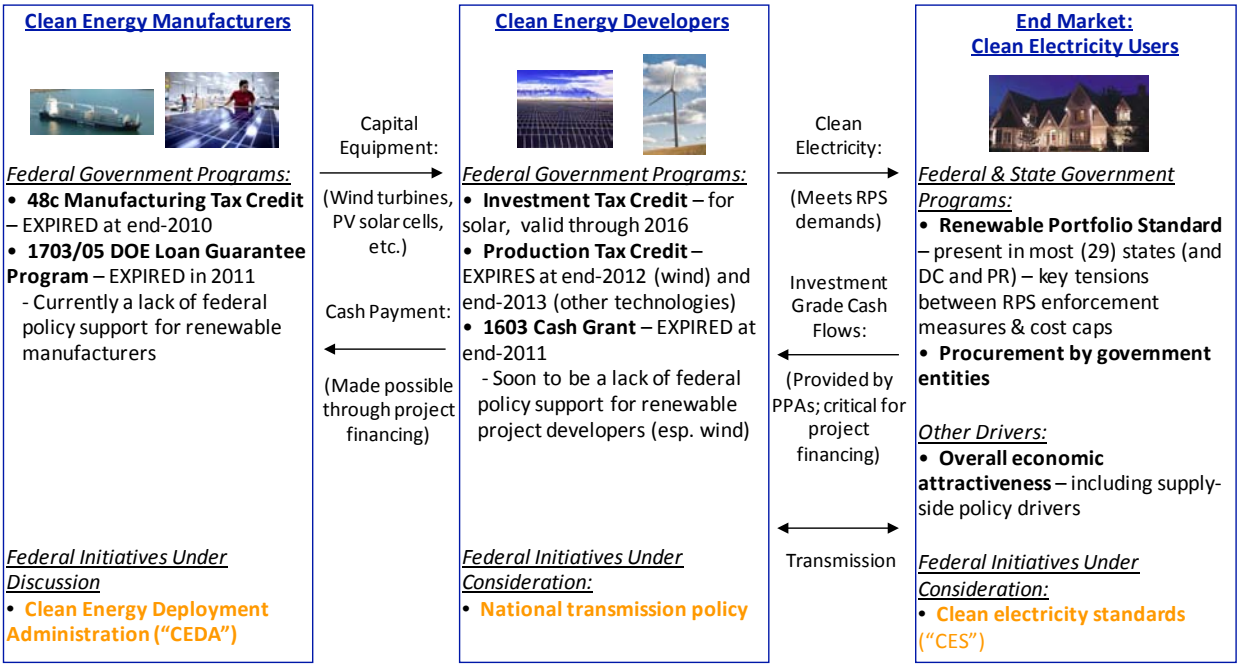
Sources: EIA, DBCCA analysis, 2012

Federal and state policies have been instrumental in enabling America to realize the benefits of clean energy. On the *supply side*, incentives such as the Production Tax Credit, Investment Tax Credit, and 1603 Treasury Cash Grant program have helped to attract capital into the sector. On the *demand side*, state-level Renewable Portfolio Standards (RPS) that require utilities to procure minimum percentages of electricity from renewables sources[11] – the focus of this paper – have provided critical "demand pull" to promote deployment of new renewable generating capacity even amid sluggish growth in overall power demand.

[10] For more detail, see the companion US PREF paper "Clean Energy and Tax Reform".

[11] Most RPS standards specify a minimum percentage of electricity that must be procured from renewable sources; Texas and Iowa, however, have "capacity-based" standards that simply require addition of a minimum amount (MW) of renewable generating capacity. For more detail, see the Database of State Incentives for Renewable Energy (DSIRE).

Figure 2 Supply and Demand for Renewable Energy and Relevant Federal/State Policies



Source: US PREF analysis

Success in reaching RPS targets will hinge in part on greater amounts of capital formation and accessibility to private financing. Unfortunately, just as the national benefits of deploying renewable energy are set to increase, policies that have motivated significant levels of capital formation and private investment in renewable energy are set to plateau or decline. Combined with similar cuts to other programs, expiration of the 1603 Treasury cash grant program (at year-end 2011) and scheduled expiration of the Production Tax Credit for wind power (at year-end 2012) will reduce federal spending on renewables from $44 billion in 2009 to $11 billion in 2014.[12] This creates substantial uncertainty in the near and medium-term outlook for renewable energy, which threatens continued US market momentum and ability to meet RPS targets.

Retrenchment on the federal level will leave RPS mandates in 29 states as the chief medium-term policy driver for new investment in renewable energy. To examine what this means for the growth of renewable energy in the US, this paper (1) introduces RPS policies, describes their compliance and enforcement mechanisms, and projects RPS-driven demand for new renewable generation and capacity by state (or region) out to 2030[13]; and (2) considers ways to cost-effectively amplify the "demand pull" from RPS programs – such as increased RPS targets, best-practice procurement mechanisms, and complementary supply-side tax incentives.

[12] For detail on federal spending, see "Beyond Boom and Bust: Putting Clean Tech on a Path to Subsidy Independence", Brooking Institution, April 2012.

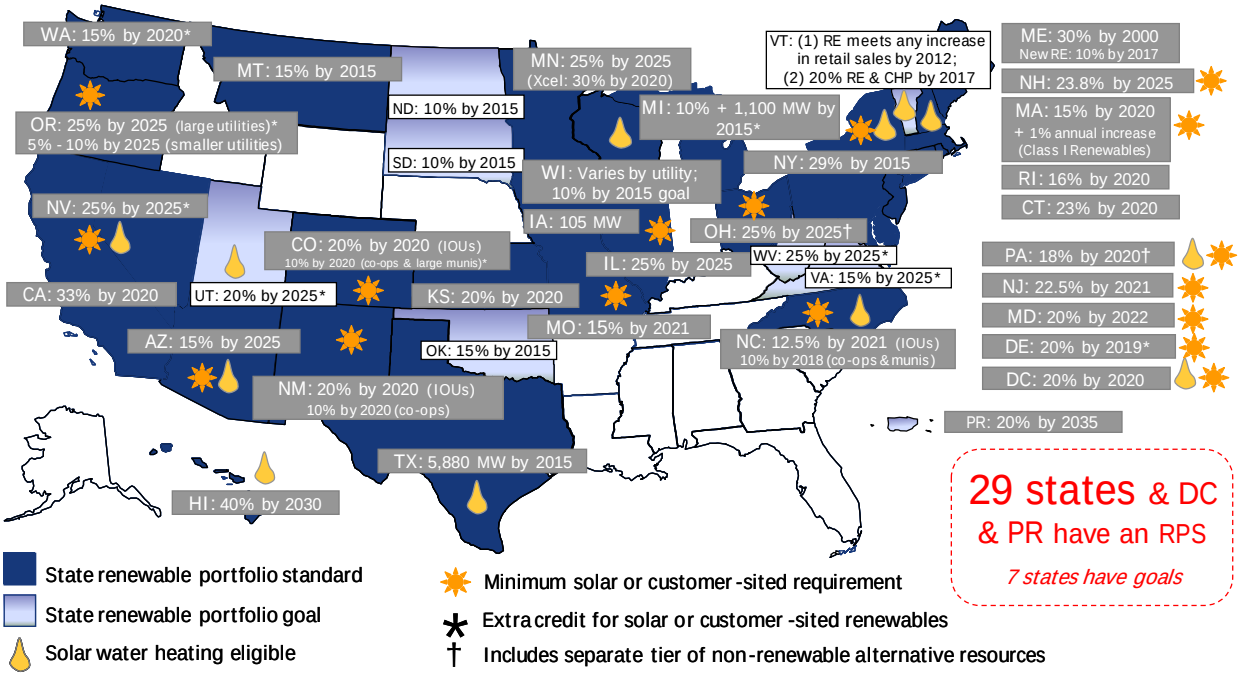
[13] These projections draw on data from Bloomberg New Energy Finance (BNEF) and Lawrence Berkeley National Laboratory (LBNL).

SECTION ONE: CURRENT STATE OF RPS INITIATIVES

A Renewable Portfolio Standard (RPS) is a state-level policy intended to increase the generation of electricity from renewable sources. Though no two states have exactly the same RPS program – ability to tailor to state-specific conditions is one of the strengths of RPS policies - the core aspect of an RPS program is a mandate that electric utilities within a state must procure a minimum percentage or absolute amount of electricity from renewable sources by a specific date.

As of May 2012, 29 states (plus Washington DC) have enacted RPS programs that include such time-bound mandates for procurement of renewable electricity (with an additional 7 states having enacted RPS policies that set voluntary goals for renewable electricity procurement). Such programs often include "set-asides" or "carve-outs" specifying minimum percentages of electricity to be generated from particular technologies; for example, the figure below illustrates RPS policies in 17 states to include set-asides for solar PV.

Figure 3 Renewable portfolio standards by state, listing the mandated % of electricity to be procured from renewables and the targeted date



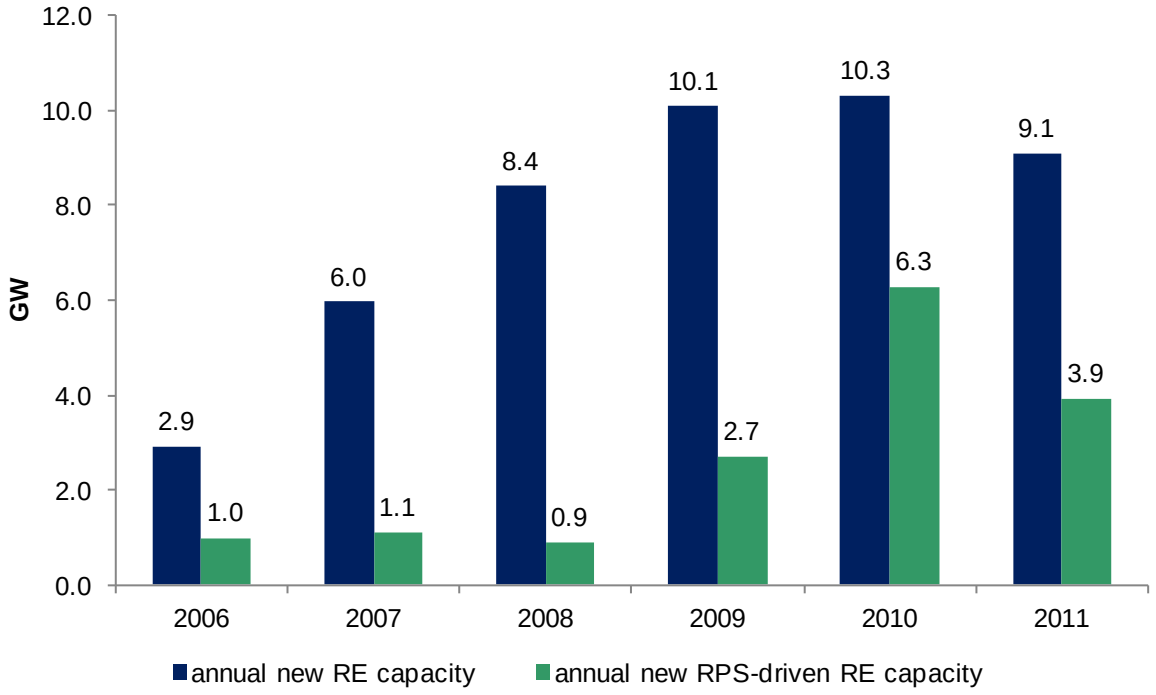
Source: US Database of State Incentives for Renewables and Efficiency, Goldman Sachs

RPS as Strong Drivers of the Growth of US Renewable Generation

Of the 200,000 gigawatt-hours (GWh) of US non-hydro renewable electricity in 2011, one-third represents new renewable electricity spurred by implementation of RPS mandates. Given that RPS mandates have supported creation of new renewable electricity generation, they by definition have supported installation of new renewable electric generating capacity. The figure below demonstrates, for 2006-2011, the portion of total US new renewable generating capacity that was needed to meet RPS mandates for that year. From 2008-2011, new RPS-driven capacity averaged 3.5 GW per year while total new renewable capacity additions averaged 9.5 GW per year (in both cases, wind turbines accounted for the majority of new capacity added). Hence, from 2008-2011 RPS "demand pull"

accounted for 36% of total additions of new renewable generating capacity in the US; installation of the other 64% (i.e. 6 GW per year) reflects chiefly decreasing capital costs for renewable technologies and the impact of supply-side federal tax incentives such as the Production Tax Credit and Investment Tax Credit.[14]

Figure 4 Impact of RPS programs on growth of US renewable generating capacity, 2006-2011



Note: RE capacity figures includes generation wind, solar, biomass, and geothermal capacity, but excludes conventional hydroelectric capacity.
Source: LBNL, DBCCA analysis, 2012

While the totals have been far smaller, RPS carve-outs for solar generation have been similarly strong drivers of the growth in solar generation and installation of new solar generating capacity.

RPS-driven Incremental Demand for Renewable Electricity and Generating Capacity to 2030

RPS mandates should be thought of as providing a floor on deployment of new renewable generating capacity. In the absence of a national carbon price or clean energy standard, state-level RPS programs – mandating that electric utilities procure minimum percentages of electricity from renewable sources by specific dates - will throughout the rest of the decade remain the chief policy driver of demand for renewable generation. Recognizing this raise the question of how much additional generating capacity must be built in order to enable this increase in generation.

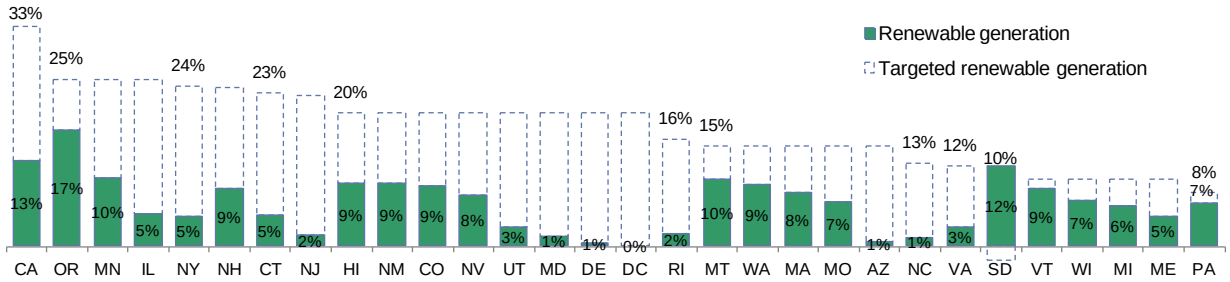
Mind the Gaps

[14] *This calculation simplifies matters slightly, as some portion of the 6 GW per year reflects new capacity added to meet RPS mandates in future years*. That said, willingness of developers to build capacity in advance of RPS obligations reflects in part the economic impact of federal tax incentives. As noted above, developers are eligible for such tax incentives irrespective of whether they are selling power/RECs into RPS markets.

SUMMARY

A state's "RPS generation gap" for a given year will be equal to the difference between its share of renewable generation for that year and the share of renewable generation needed to fulfill its ultimate RPS target. The figure below illustrates that, as of 2010, the size of such gaps varied from one percentage point in Pennsylvania to twenty percentage points in California. As RPS mandates have ramped up over the past few years, however, utilities in the majority of states have recorded 90-100% compliance with RPS obligations.

Figure 5 Renewable generation as a % of retail electricity sales (2010)



Note: Exemptions or lower mandates for certain utilities (e.g. publicly-owned municipal utilities and co-ops) and "credit multipliers" for certain classes of generation (i.e. 2X for in-state generation) will in many states reduce the actual RPS target below the figure shown above. As a result, the existing gap between renewable generation and the target level will be smaller than that shown above.
Source: EIA, SNL, AWEA, Goldman Sachs Research estimates.

Building the Capacity to Close GWh Gaps

Boosting the share of non-hydro renewables to meet RPS targets will require adding new wind, solar, biomass, and geothermal electric generating capacity. Since every state RPS program permits utilities to fulfill some portion of RPS obligations via imports of power and Renewable Energy Credits (RECs) from states within the same regional power market, the figure below aggregate state level estimates up to the level of the Regional Transmission Organization (RTO) or regional tracking system for RECs.

Table 1 States within regional power markets or REC trading zones

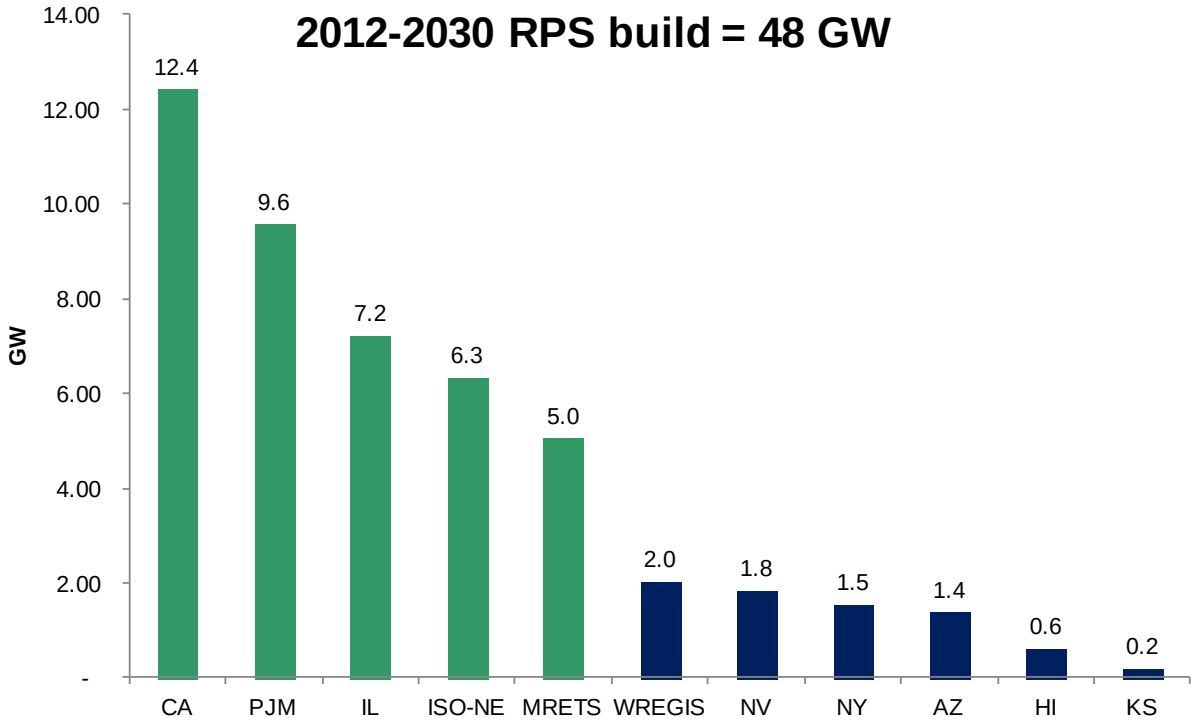
Region	States with binding RPS programs
PJM	Delaware, Maryland, Michigan, New Jersey, Pennsylvania, and the District of Columbia (North Carolina excluded).
ISO-NE	Massachusetts, Rhode Island, New Hampshire, Connecticut, and Maine.
M-RETS	Iowa, Minnesota, Montana, North Dakota, Ohio, and Wisconsin (excludes Illinois).
WREGIS	Colorado, New Mexico, Oregon, Utah, and Washington (excludes California and Nevada).

Source: DBCCA analysis 2012.

In forecasting capacity required to meet RPS gaps, Bloomberg New Energy Finance (BNEF) assumes a 33% average capacity factor similar to that of a US onshore wind farm (heretofore the dominant renewable generation technology in the US). BNEF also allows for states to meet their RPS

requirements via imports of electricity from other states. Below are the BNEF estimates for the required additions of overall RE capacity to meet RPS targets (*note that, for states with carve-outs just for solar, the estimates below omit capacity required to meet these solar carve-outs).*

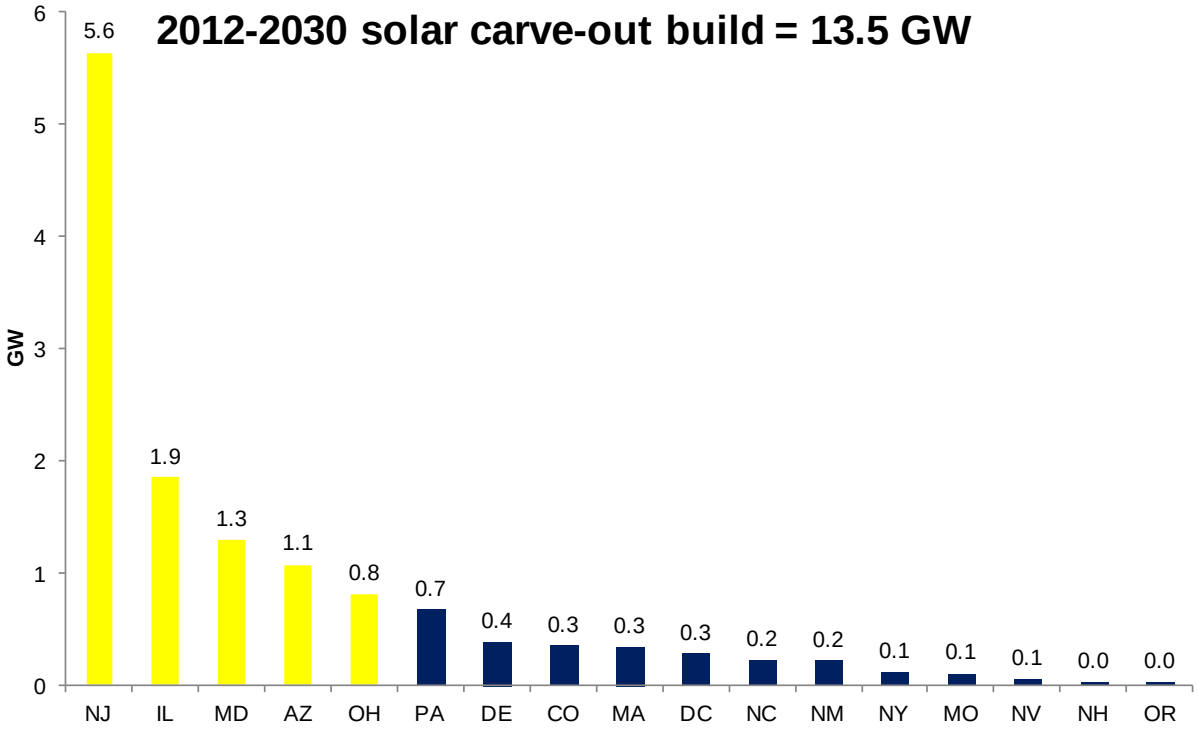
Figure 6 New renewable capacity needed to meet RPS targets, 2012-2030



Note: States/regions in green comprise 80% of total. For states with carve-outs just for solar, excludes generation needed to meet solar carve-out targets. PJM is a 13-state Regional Transmission Organization. ISO-NE is the Independent System Operator for New England. MRETS is the Midwest – Renewable Energy Tracking System. WREGIS is the Western Renewable Energy Generation Information System. ERCOT is the Electric Reliability Council of Texas.
Source: Bloomberg New Energy Finance, DBCCA analysis 2012.

Since carve-outs for distributed or solar generation must be met by a specific type of capacity (i.e. solar PV or, in some cases, CSP), the figure below draws on LBNL projections to illustrate required capacity additions to meet solar carve-outs through 2030.

Figure 7 New solar capacity needed to meet solar set-aside targets, 2012-2030



Note: States in yellow comprise 80% of total. Addition of solar generating capacity in excess of RPS solar carve-out targets in years prior to 2012 may reduce required incremental solar generation through 2030 below the 13.5 GW figure above. Values converted from AC to DC assuming 77% conversion ratio. AZ, CO, NM, and NV assumed to meet some portion of required solar generation via concentrating solar power (CSP); all other states assumed to meet 100% of required solar generation through solar PV.
Source: Lawrence Berkeley National Laboratory, DBCCA analysis 2012

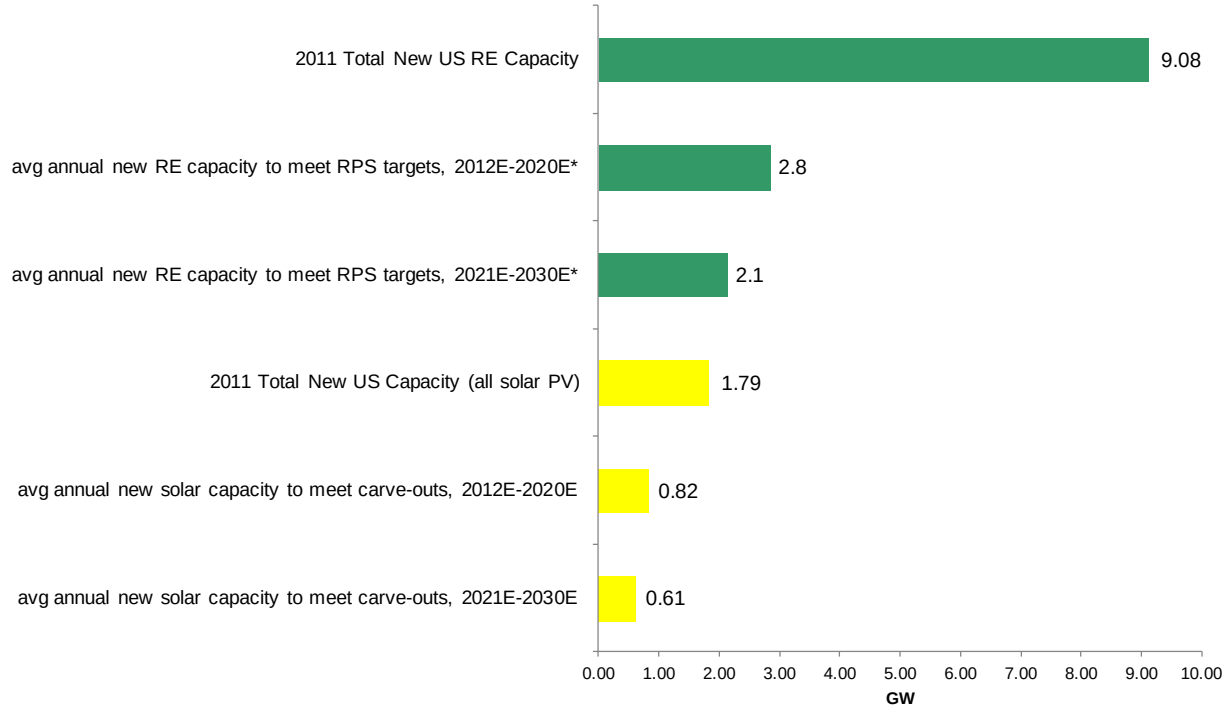
National impact of RPS programs on additions of new renewable generating capacity

The figure below (1) projects average annual additions of renewable and solar generating capacity needed to meet RPS targets and solar carve-outs from 2012-2030 and (2) compares these projections with total new installations of renewable and solar generating capacity in 2011. The chief takeaway is that through 2030 RPS mandates will collectively *support the addition of only 3.25 GW of new renewable generating capacity per year* (with 0.7 GW of this total linked to satisfying solar carve-outs).[15] This level of RPS-supported demand represents a decline from the level of RPS-supported demand during 2008-2011.[16] The secondary takeaway is that (including new capacity to fulfill solar carve-outs) average annual RPS-supported capacity additions through 2030 equal only one-third of total new renewable capacity added in 2011. This suggests that, going forward, *RPS programs will make a valuable but limited contribution to deployment of new renewable generating capacity in the US.*

[15] The 3.25 GW figure reflects the sum of 2.55 GW per year of new renewable generating capacity to meet Tier 1 (i.e. non-technology specific) RPS targets (excluding solar carve-outs), and 0.7 GW per year of new solar generating capacity (mostly solar PV) to meet solar carve-outs.

[16] While demand supported by solar carve-outs is projected to continue to grow after 2011, the sum of Tier 1 and solar-specific demand declines after 2011. As discussed below, since in many states solar installations have already begun to exceed carve-out minimum levels, for solar the more relevant number may be the level of RPS-supported demand for renewables *overall*, rather than for solar in particular.

Figure 8 Projected RPS-driven new additions RE and solar capacity vs. total new additions in 2011



*Note: *RE capacity figures exclude capacity needed to meet solar carve-out targets. RE capacity figures assume 33% capacity factor (similar to that of a US onshore wind farm). A portion of new solar capacity to meet carve-outs is projected to come in the form of concentrating solar power, rather than solar PV.*
Source: Bloomberg New Energy Finance, Lawrence Berkeley National Laboratory, DBCCA analysis 2012.

Note that a plateau in RPS-driven demand – particularly related to solar carve-outs – does *not* mean that investment in such technologies will necessarily cease to grow. Increasing cost-competitiveness with conventional generating capacity combined with remaining incentives will enable continued deployment of renewables in line with "RPS demand pull."[17] The plateau in RPS-driven demand for renewables overall, however, *does* suggest that policy support for investment in renewable energy will be *stagnating* just as America's need for the energy diversity and security benefits of renewable energy are *increasing* as more new gas plants are built and so exposure to uncertain long term fossil prices will continue. That the plateau in RPS-driven demand will coincide with scheduled expiration and reduction of key federal incentives makes the potential negative impact on growth of renewables particularly significant.

[17] In the case of solar in particular, continued declines in technology cost plus the continued availability of other incentives in many states (e.g. upfront rebates) suggest that in future years annual new additions of solar capacity will by no means be limited to 0.7 GW per year. That said, maxing out of solar carve-out (and consequent decline in the level of RPS-related incentives) will in many states – particularly those with below-average retail electricity rates – deprive solar PV of enabling incentives before the technology has become fully cost-competitive with conventional electricity sources. This suggests that increasing the size of RPS targets (including related solar carve-outs) can ensure that solar PV continues to progress toward grid-competiveness throughout multiple regions of the US.

Enforcement and Cost-Control – How likely is it that states will meet RPS mandates?

What distinguishes mandatory state RPS *targets* from merely voluntary or aspirational *goals* is that mandatory targets are (1) codified as legal obligations; and (2) backed by sanctions or penalties that serve to encourage compliance. The table below lists the penalties that the 12 states with significant RPS programs may levy against utilities whose procurement of renewable generation falls short of prescribed RPS levels.

Table 2 Compliance and Enforcement Mechanisms in 12 of the States with the Most Significant RPS Mandates

	Specified Monetary Penalties (2013 values)		Additional Penalties that PUC may Impose	
State	ACP	$/MWH fine	Suspend/Revoke License	Additional Fines
CA		$50/MWh, up to $25MM per utility		
IL	N/A	N/A	N/A	N/A
OH	$45/MWH			
NJ	$50/MWh		x	x
MN				x (not to exceed cost of needed RECs)
WA		$50/MWh		
MD	$40/MWh			x
MA	x		x	
AZ		PUC discretion		
OR	x	PUC discretion		
NC		PUC discretion		
MO	x	x		

Note: Ohio, New Jersey, and Maryland also have separate Solar Alternative Compliance Payments (SACP) used specifically for compliance with solar carve-outs in those states. In Massachusetts and New Jersey utilities/distributors can automatically recover the cost of ACP payments in retail rates; Maryland and Oregon allow cost recovery only if the PUC deems ACPs to have been the least-cost compliance option. Ohio does not allow cost-recovery of ACPs. Washington and Arizona only in some cases allows the cost of discretionary penalties to be recovered in retail rates. Missouri and California do not allow automatic recovery of the cost of $/MWh fines. All columns N/A for Illinois because Illinois relies on a state administrative agency to procure renewables on behalf of the state's utilities.
Source: DSIRE, Union of Concerned Scientists, LBNL DBCCA analysis 2012

Extending the reasoning that a utility's calculus for RPS compliance will reflect chiefly economic considerations, embedded in RPS legislation is frequently a state's calculus of how much it is willing to invest to increase the generation of electricity from renewable resources. The two middle columns of the table below enumerate cost caps that, in eight of the twelve states, constrain either the total dollar amounts to be spent on RPS compliance. Note that these caps apply to the "incremental" cost of complying with an RPS target – that is, the cost of purchasing required renewable MWhs (or RECs) *over and above* the cost of purchasing an equivalent amount of non-renewable energy.[18]

[18] While states define "incremental" in different ways, there is some uniformity across states. Washington state's RPS statute, for example, defines the incremental cost of an eligible renewable resource is determined by calculating "the difference between the levelized delivered cost of the eligible renewable resource, regardless of ownership, compared to the levelized delivered cost of an equivalent amount of reasonably available substitute resources that do not qualify as eligible renewable resources, where the resources being compared have the same contract length or facility life."

Table 3 Cost-Containment Policies in 12 of the States with the Most Significant RPS Mandates

	Consumer	*Distributor*	
State	**Ratepayer Surcharge**	**de facto Cost Cap**	**Delay/Escape Clauses**
CA	N/A	N/A	N/A
IL	2.015% of 2007 retail rate		If annual cost cap is met or exceeded
OH		$45/MWh	Caps compliance costs at 3% premium above cost of non-renewable electricity
NJ		$50/MWh	
MN			PUC discretion for two-year delay
WA			If incremental compliance costs exceed 4% of utility's annual retail revenue requirement
MD			If cost of purchasing non-solar Tier 1 RECs exceeds 8% of utility's annual electricity sale revenues in MD*
MA		ACP	
AZ	PUC discretion		PUC discretion
OR			If incremental compliance costs exceed 4% of utility's annual retail revenue requirement
NC	$12.00/account		Ratepayer surcharge cap; and PUC discretion
MO	1% of average retail rate		

Note: All columns N/A for California because SB 2 (1X2), signed by California's governor in April 2011, eliminated the state's existing cost caps; new cost-containment mechanisms are in development and have not yet been enacted. In Maryland, there is a delay/escape clause for compliance with the state's solar carve-out if the cost of purchasing solar RECs exceeds 1% of utility's annual electricity sale revenues in MD. Source: DSIRE, LBNL, Union of Concerned Scientists, DBCCA analysis 2012.

Cost-cap proceedings are currently underway (or set to begin shortly) in Ohio, New Mexico, Colorado and Arizona. While most observers expect existing RPS targets and compliance deadlines to emerge from these proceedings largely intact, they illustrate that achievement of RPS targets in contingent on staying within prescribed economic constraints. While examining the likelihood that every individual cost cap will prove binding is beyond the scope of this paper,[19] *in general the costs of new renewable electricity are sufficiently below the caps embedded in RPS mandates that most states are highly likely to meet their RPS obligations and deadlines out to 2030*. Evidence in support of this judgment comes from the success that several states wind-rich states (i.e. Texas, Iowa, Oregon) have had in either meeting their end-state RPS targets or complying with such targets well ahead of mandated deadlines. As declines in the cost of solar technologies broaden another means for cost-effective RPS compliance (already in wide use in California and other western states), the likelihood that states will meeting existing RPS targets without delay or interference only increases.

[19] Given the broad latitude that many states accord to their PUCs in determining exactly what these levels are, this suggests that the robustness of a given RPS target depends largely on (1) the cost competitiveness of the state's renewable resources; and (2) how willing the state's PUC is to integrate RPS compliance into its traditional "least-cost" mandate.

SECTION TWO: WAYS TO MAKE RPS PROGRAMS MORE EFFECTIVE

To help America realize the full long-term economic, environmental and energy security benefits of renewable energy – as well as the more immediate benefits of a vital US renewables industry – *there are multiple ways to ramp up and sustain support for renewable energy demand*. *Promising measures to consider include: stronger RPS targets, best-practice procurement mechanisms, support for transmission development, and, potentially, broader interstate REC trading.* The table below samples different measures that policymakers might consider to augment demand for renewable power in the US.

Table 4 Promising options to support greater US deployment of renewable energy technologies

Strengthen/Accelerate RPS targets	Given progress toward meeting existing RPS mandates, states might consider raising RPS targets (as CO did in 2007 and 2010) or accelerating the timeline for compliance (as Maryland recently did).
Reverse Auction Mechanisms (RAMs)	As renewable generation becomes more cost-competitive, policymakers might consider procuring more electricity from large-scale projects via RAMs – similar to the Renewable Auction Mechanism in California.
Rebate Programs and Performance-based Incentives (PBI)	In addition to capacity-based rebate programs such as the California Solar Initiative (CSI), PBI programs – which pay a $/kWh incentive over a period of 10 or 20 years – might help to spur adoption of residential solar PV and other distributed generation technologies. PBI rates, however, must be sufficient to spur deployment.
Net Metering	In place in 40 states, these policies enable owners of residential PV systems to sell excess electricity back to the grid at retail rates. Updating such policies to enable greater volumes can help America to harness the benefits of falling costs for small PV systems.
Feed-in tariffs (FiT) and Clean Local Energy Accessible Now (CLEAN) programs	FiT and CLEAN programs see utilities sign long-term contracts to buy electricity from renewable sources at fixed $/kWh rates. New policies – such as California's SB 32 program – can help to particularly spur deployment of *wholesale* (1 – 20 MW) distributed generation.
Trading of Renewable Energy Credits (RECs)	Provided that they protect the critical energy diversity benefits of distributed generation, policies to broaden interstate REC trading may be another option to consider
Finance Needed Transmission	Allow more flexibly cost-recovery of transmission to interconnect renewable resources (as in California's Location-Constrained Resource Interconnection Facility) and encourage development of transmission in resource-rich regions.

Source: DBCCA analysis 2012.

Complementary Federal Policies through the PTC and ITC

Since more ambitious RPS targets and new procurement mechanisms are unlikely to emerge rapidly, federal tax incentives can complement these longer-term, state-level initiatives with more targeted transitional efforts. The Production Tax Credit and Investment Tax Credit can help to sustain private investment in renewable energy.[20] Going forward, *coordinating transitional, supply-focused federal tax incentives with longer-term, demand-focused RPS programs can be explored as part of an integrated renewable energy strategy for America.* Understanding more clearly how these two sets of policies interact can help inform what an appropriate synthesis will look like. Entities such as the National Renewable Energy Laboratory and Lawrence Berkeley National Laboratory could examine federal-state policy interaction on renewable energy.

[20] At present, the PTC is set to expire at the end of this year. For more discussion, see our companion US PREF paper "Clean Energy and Tax Reform".

SUMMARY

Conclusion

This paper finds that fulfilling RPS mandates through 2030 will support the addition of 3.25 GW of new renewable generating capacity in the US. This represents a slight decrease from the level of RPS-supported new capacity additions in 2008-2011, and amounts to roughly only one-third of total new renewable generating capacity added in the US in 2011 (9 GW). These comparisons inform a central finding of this paper that RPS mandates will make a valuable but limited contribution to demand for new renewable electricity in the US.

Given that deploying renewable generating capacity benefits America's economy, environment, and energy security, consideration should be given to ways to enhance demand for renewable electricity. Promising measures to consider include strengthening existing RPS targets, procuring more renewable electricity through reverse auctions (for large-scale projects), and introducing more local incentives such as CLEAN (Clean Local Energy Accessible Now) programs, feed-in tariffs, and performance-based incentive rebates. Provided that they protect the energy diversity and local economic benefits of distributed generation, policies to broaden interstate trade in Renewable Energy Credits (RECs) may be another option to consider.

In the shorter term, state-led efforts can be complemented with supply-side incentives such as the Production Tax Credit and Investment Tax Credit. Going forward, *coordinating transitional, supply-focused federal tax incentives with longer-term, demand-focused RPS programs as part of an integrated renewable energy strategy for America should be explored.* The actions outlined above will inject a healthy dose of competition and innovation into the US power sector. Additionally, they will enable the US to continue to reap the benefits of large-scale renewable energy deployment – including lower long-term costs, greater technological diversity, utilities, businesses and consumers, and increased protection from the economic and security risks inherent in fossil fuels.

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ABOUT US PREF

US PREF is a coalition of senior level financiers who invest in all sectors of the energy industry, including renewable energy. Members educate the public sector to assure renewable energy finance legislation impacts the market as efficiently and effectively as possible, with the goal of helping to unlock capital flows to renewable energy projects in the United States. US PREF is a program of the American Council On Renewable Energy (ACORE), a Washington, DC - based non-profit organization dedicated to building a secure and prosperous America with clean, renewable energy.