
US Experience and Lessons on RE Quota Systems (RPS)

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System in China

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Presentation Outline

- 1) RPS Overview and Framework in the U.S.
- 2) Experience with RPS Implementation
- 3) Lessons Learned for Quota Design
- 4) Possible Implications for China

Multiple Renewable Energy Policy Drivers in the U.S.; RPS Among the Most Important

- **Federal Tax Incentives:** production tax credit, investment tax credit, accelerated depreciation
- **Economic Recovery Act:** Treasury Grant Program, loan guarantees
- **State Incentive Programs:** focused on distributed generation and solar, FITs
- **State RPS Policies:** primary form of state support for renewable energy

What Is a Renewables Portfolio Standard?

Renewables Portfolio Standard (RPS):

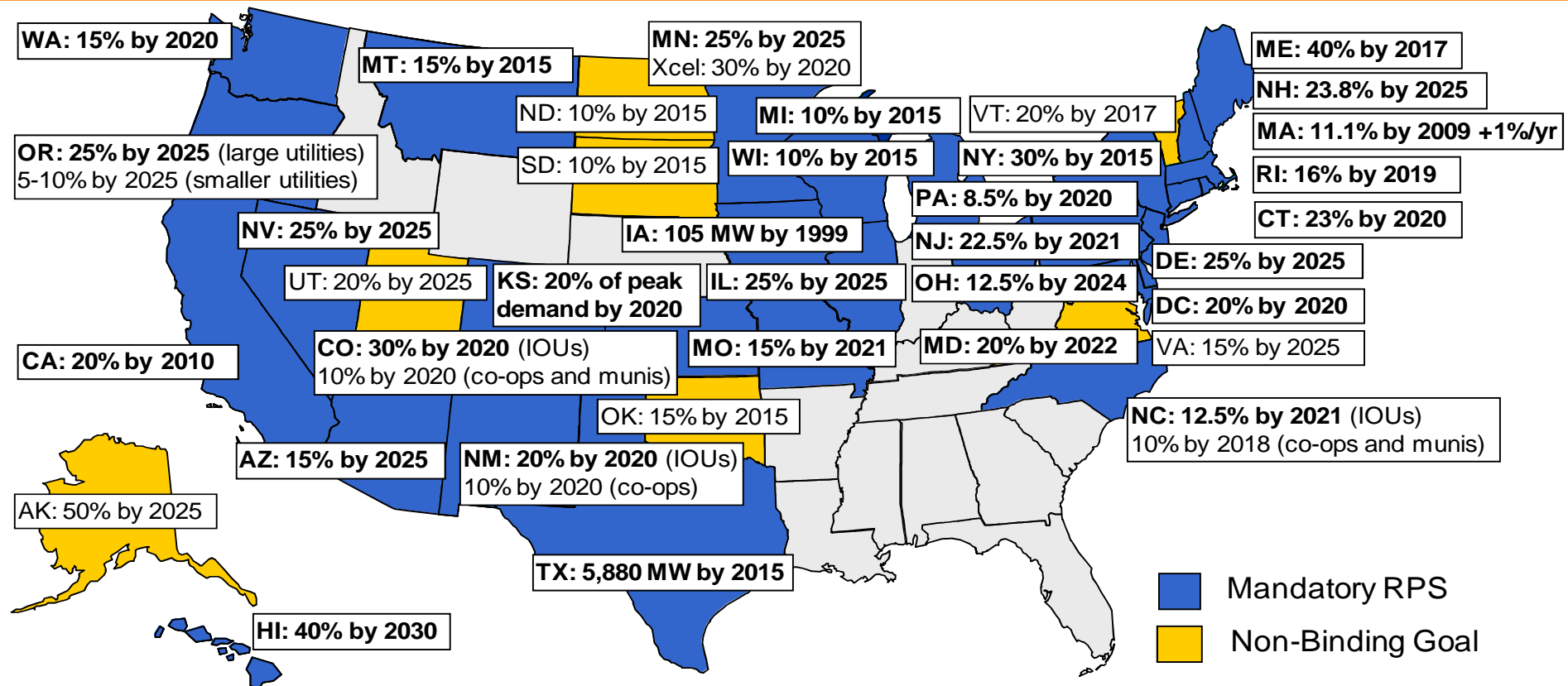
- A requirement on *retail* electric suppliers...
- to supply a minimum and steadily growing percentage or amount of their retail load...
- with eligible sources of renewable energy.

Typically backed with penalties of some form

Often accompanied by a tradable renewable energy credit (REC) program, to facilitate compliance

Never designed the same in any two jurisdictions, but in the US always applied to retail electric suppliers

Mandatory RPS Policies Exist in 29 States and D.C.; 7 More States Have Non-Binding Goals



Source: Berkeley Lab

Federal government continues to consider national RPS, but both sides of Congress have never passed the same bill; Obama Administration supports Federal RPS



State RPS Policies Feature Significant Design Differences

- Renewable purchase targets and timeframes
- Exemptions to certain retail electricity suppliers
- Eligibility of different renewable technologies
- Whether existing renewable projects qualify
- Treatment of out-of-state generators
- Whether technology set-asides or other tiers are used
- Renewable energy certificate trading rules
- Compliance flexibility rules, and methods to enforce compliance
- Existence/design of cost caps
- Contracting requirements and degree of regulatory oversight
- Compliance filing and approval requirements
- Role of state funding mechanisms, feed-in tariffs, other policy mechanisms

RPS Policies Are Periodically Revised: Notable Recent Trends in RPS Design

- Increased stringency of RPS purchase targets and therefore RE deployment requirements
- Expanded applicability to all utilities, with fewer exceptions and exemptions
- Expanded use of resource-specific set-asides or tiers to encourage diversity of RE technologies

Diversity of design and experience provides a wealth of information on what does, and does not, work!

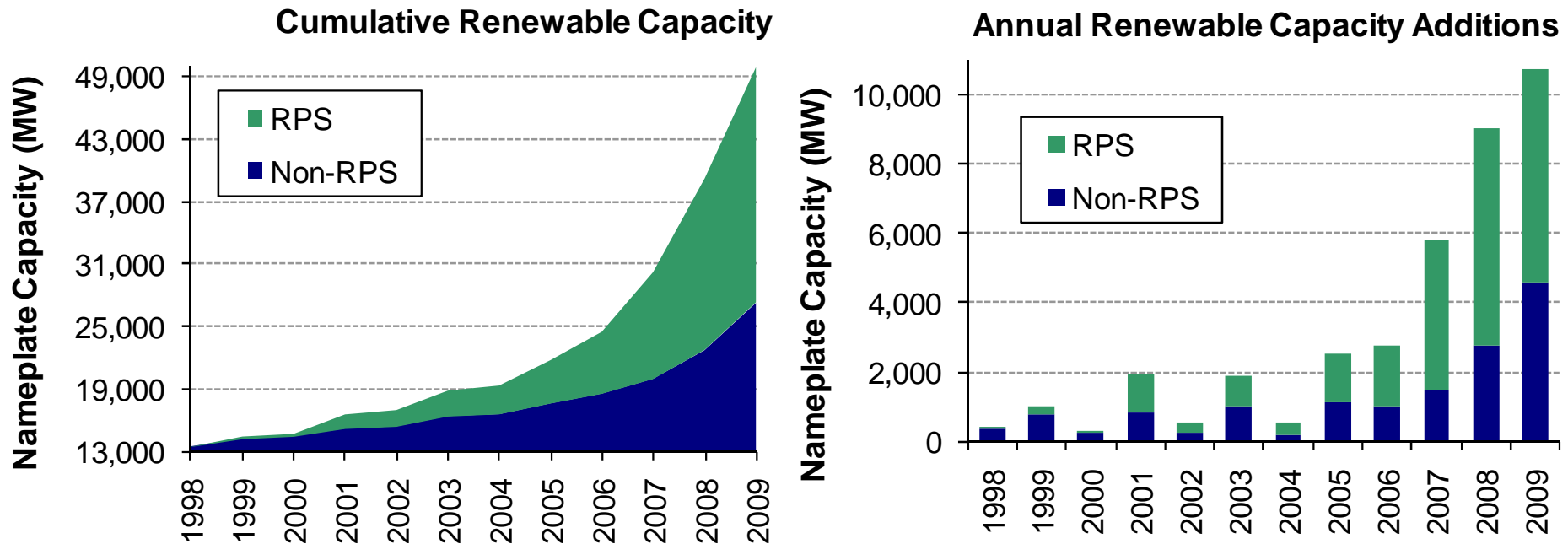
Operational Experience with State RPS Policies Is Growing

Operational Experience with State RPS Policies (years since first major compliance period)



State RPS' Have Already Motivated Substantial RE Development

Cumulative and Annual Non-Hydro Renewable Energy Capacity in RPS and Non-RPS States, Nationally



61% of the 37 GW of non-hydro renewable additions from 1998-2009 in the U.S. (**23 GW**) have occurred in states with active/impending RPS compliance obligations

RPS Targets Have Mostly Been Met, Though Struggles Are Apparent in Some States

**Percent of RPS Target Met with Renewable Electricity or RECs
(including available credit multipliers and banking, but excluding ACPs and borrowing)**

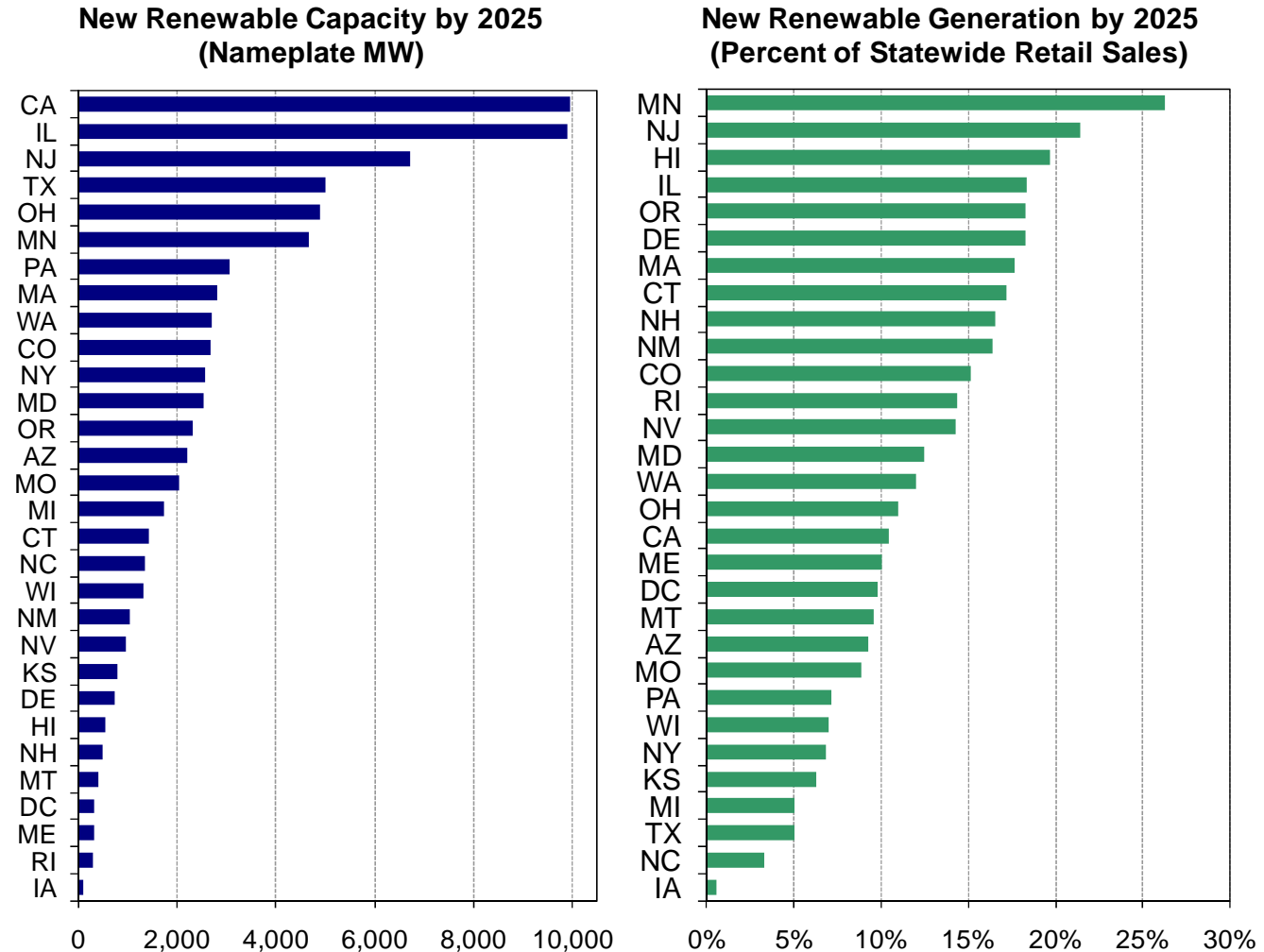
State	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
AZ	-	-	89%	64%	31%	31%	26%	25%	30%	88%
CA	-	-	-	-	-	100%	100%	98%	97%	88%
CO	-	-	-	-	-	-	-	-	100%	100%
CT	-	no data	no data	no data	no data	100%	100%	96%	100%	no data
DC	-	-	-	-	-	-	-	-	99%	100%
DE	-	-	-	-	-	-	-	-	97%	96%
HI	-	-	-	-	-	-	100%	-	-	-
IA	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
IL	-	-	-	-	-	-	-	-	-	100%
MA	-	-	-	-	100%	65%	64%	74%	99%	100%
MD	-	-	-	-	-	-	-	100%	100%	100%
ME	-	100%	100%	100%	100%	100%	100%	100%	100%	100%
MN	-	-	-	61%	72%	72%	81%	no data	99%	100%
MT	-	-	-	-	-	-	-	-	-	99%
NH	-	-	-	-	-	-	-	-	-	63%
NJ	-	-	100%	100%	100%	100%	100%	100%	100%	99%
NM	-	-	-	-	-	-	-	100%	100%	100%
NV	-	-	-	-	30%	30%	95%	39%	50%	100%
NY	-	-	-	-	-	-	-	52%	25%	24%
PA	-	-	no data	no data	-	-	-	100%	100%	88%
RI	-	-	-	-	-	-	-	-	98%	100%
TX	-	-	-	99%	96%	99%	99%	100%	99%	100%
WI	-	40%	100%	100%	100%	100%	100%	100%	88%	99%
Weighted Average	100%	98%	100%	91%	86%	94%	97%	94%	92%	90%

blank cells = no compliance obligation existed in that year
 "no data" = compliance data unavailable for that year

Future Impacts of Existing RPS Policies Are Projected To Be *Relatively* Sizable

~76 GW of new RE* by 2025, if full compliance is achieved (97 GW including voluntary goals and 33% CA RPS)

6% of projected generation in 2025; 29% of projected load growth from 2000-2025



* New renewables defined based on state-specific distinctions between new vs. existing or on the year in which the RPS was enacted



U.S. Experience and Lessons Learned: Not An Easy Policy To Design Well

- **RE Development Has Outpaced RPS Requirements** → need to be nimble, increase RPS to support continued development
- **Lack of Resource Diversity: Dominated By Wind** → states moving towards tiered RPS requirements in many cases
- **Short-Term Trade in RECs Not Providing Adequate Certainty for Developers** → multiple strategies to encourage/require longer-term contracts; still a challenge; need policy stability
- **Compliance Not Always Achieved** → RPS needs to be aggressive/tracked/enforced to drive development, but also realistic
- **RPS Is Only One and Not Always the Best Policy** → comprehensive set of policies needed to solve pricing, transmission, integration, siting barriers

Possible Implications for China

1st Be Careful! Quotas Are Hard To Design; Don't Disrupt China's Already-Successful RE Policies

TOP FIVE COUNTRIES	#1	#2	#3	#4	#5
Annual amounts for 2009					
New capacity investment	Germany	China	United States	Italy	Spain
Wind power added	China	United States	Spain	Germany	India
Solar PV added (grid-connected)	Germany	Italy	Japan	United States	Czech Republic
Solar hot water/heat added ³	China	Germany	Turkey	Brazil	India
Ethanol production	United States	Brazil	China	Canada	France
Biodiesel production	France/Germany		United States	Brazil	Argentina
Existing capacity as of end-2009					
Renewables power capacity (including only small hydro)	China	United States	Germany	Spain	India
Renewables power capacity (including all hydro)	China	United States	Canada	Brazil	Japan
Wind power	United States	China	Germany	Spain	India
Biomass power	United States	Brazil	Germany	China	Sweden
Geothermal power	United States	Philippines	Indonesia	Mexico	Italy
Solar PV (grid-connected)	Germany	Spain	Japan	United States	Italy
Solar hot water/heat ³	China	Turkey	Germany	Japan	Greece

China Is Unique: Coordination Among Multitude of Policy Efforts Is a Key Challenge

- National RE targets; provincial targets
- Feed-in tariff for wind / biomass
- Concessions for off-shore wind, PV, CSP, other
- Programs that deliver up-front grants for PV
- Renewable energy fund to share cost
- Quota on large generating companies
- Possible quota on grid companies

Almost every policy in the book is being used in China and within a unique energy market structure

- International experience is of limited relevance
- Key issue is how the quotas will coordinate with the already-successful feed-in tariff and other policies?

One Example of the Coordination Challenge: RECs Trade Does Not Seem to Make Sense

- Wind generators fully compensated by feed-in tariff: why should the generator receive a REC in order to receive higher revenue? Whom would they sell it to – Generating Companies, Grid Companies, Provinces?
- If “trade” is allowed, better to allow Generating and Grid Companies and Provinces to trade their quota obligations: entities that under-procure RE “sell” a portion of their quota to entities that over-procure (similar to expected trade in the EU among countries under the RE Directive)
- Even then, especially given the existence of the RE Fund, how would the price of a Quota transaction be established? The Fund already allocates cost, so what is the value of trade?
- **Better Option: Differentiated targets; no or limited trade; RE Fund equilibrates cost**

Design the Policy To Solve Observable Problems, Given Transparent Solutions

What concerns exist about RE development in China under the current RE Law framework?

- More-aggressive long- and intermediate RE targets needed
- Need for coordinated RE generation/grid planning
- Encourage/incent purchase of RE; minimize interconnection delay; minimize curtailment but do not seek to eliminate it
- Address technical/institutions aspects of system integration
- More-fairly allocate costs for interconnection, transmission, curtailment, integration; establish incentives for solutions
- Encourage maximum generator productivity, etc., etc., etc.

Quotas Can't Solve All of These Problems, But If Used, I Would Suggest...

- **Generating Company Quotas:** Few international analogs, but quotas might ideally be delineated in **MWh** not **MW** and apply to a larger set of generating companies
- **Grid Company Quotas:** Recommend regional/company-level **differentiated targets** with **no/limited trade** in quota obligations
- **Provincial Quotas:** Only establish enforceable and differentiated quotas by technology if **provinces have clear and obvious policy mechanisms** that they can use to ensure compliance; otherwise use non-binding and differentiated technology targets
- **Overall:** Targets should **increase steadily** over time to drive development, be **clearly tracked**, and be **promptly enforced**

Good Luck!

I am happy to help where I can, and look forward to hearing the proposal and resulting discussion

